

Reference Guide

# hp StorageWorks Management Information Base 4.2.x

First Edition (April 2004)

**Part Number:** AA-RV2CA-TE

This reference guide is written for system administrators and technicians to assist them in operating, maintaining, and troubleshooting HP SAN products.



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## about this guide

This document is organized to help you find information as quickly and easily as possible. As a command reference, this document begins with a brief overview of each administrator and user-level command before preceding to details.

This preface discusses the following major topics:

- [Audience](#), page 27
- [Related Documentation](#), page 27
- [Conventions](#), page 28
- [Getting Help](#), page 29

## Audience

This document is intended for use by systems administrators and technicians.

## Related Documentation

For the latest information, documentation, and firmware releases, visit the HP StorageWorks web site: <http://www.hp.com/country/us/eng/prodserv/storage.html>.

To access the technical documentation:

1. Locate the **Networked storage** section of the Web page.
2. Under **Networked storage**, go to the **By type** subsection.
3. Click **SAN infrastructure**. The **SAN infrastructure** page opens.
4. Locate the **Fibre Channel Switches** section.
5. Click the appropriate product name. The product overview page opens. Go to the **product information** section.
6. Click **technical documents**.

For information about Fibre Channel standards, visit the Fibre Channel Industry Association web site, located at <http://www.fibrechannel.org>.

## Conventions

Conventions consist of typographical elements and text symbols.

### Typographical Elements

This document follows the conventions in [Table 1](#).

**Table 1: Typography**

| Convention   | Element  |
|--|--|
| Blue text: <a href="#">Figure 1</a>  | Cross-reference links  |
| <b>Bold</b>  | Menu items; buttons; key, tab, and box names   |
| <i>Italics</i>   | Text emphasis and document titles in body text   |
| Monospace font   | User input and commands; code, file, and directory names; and system responses (output and messages) |
| <i>Monospace, italic font</i>  | Command-line and code variables  |
| Blue underlined sans serif font text ( <a href="http://www.hp.com">http://www.hp.com</a> ) | Web site addresses   |

### Text Symbols

The following symbols may be found in the text of this guide. They have the following meanings:



**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.

---



**Caution:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

---

---

**Tip:** Text in a tip provides additional help to readers by providing nonessential or optional techniques, procedures, or shortcuts.

---

---

**Note:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

---

### Equipment Symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings:



Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator-serviceable parts.

**WARNING:** To reduce the risk of personal injury from electrical shock hazards, do not open this enclosure.

---

## Getting Help

If you have any questions associated with the information in this document, contact an HP authorized service provider or access our web site: <http://www.hp.com>.

## HP Technical Support

Telephone numbers for worldwide technical support are listed on the HP web site: <http://www.hp.com/support/>. From this web site, select the country of origin.

---

**Note:** For continuous quality improvement, calls may be recorded or monitored.

---

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

## HP Storage Web Site

The HP web site has the latest information on this product, as well as the latest drivers. Access storage at: <http://www.hp.com/country/us/eng/prodserv/storage.html>. From this web site, select the appropriate product or solution.

## HP Authorized Reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, refer to the HP web site for locations and telephone numbers: <http://www.hp.com>.



# Understanding SNMP

## 1

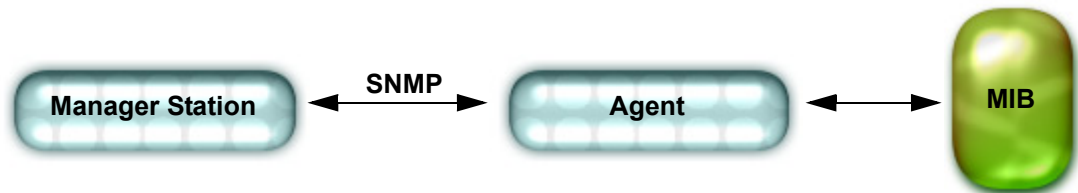
A common method for monitoring and managing a network device is using the Simple Network Management Protocol (SNMP). This protocol promotes interoperability, since cooperating systems must adhere to a common framework and language. Understanding the components of SNMP makes it possible to use any tool to view, browse, and manipulate switch variables, as well as set up an enterprise-level management process. Every HP StorageWorks switch supports SNMP.

This chapter discusses the following:

- [Understanding SNMP Basics](#), page 32
- [Loading MIBs](#), page 35

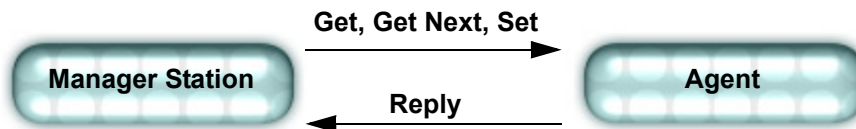
## Understanding SNMP Basics

Every HP StorageWorks Fibre Channel switch carries an agent and Management Information Base (MIB), as shown in [Figure 1](#). The agent accesses information about a device and makes it available to a network manager station.



**Figure 1: SNMP Structure**

When active, the manager station inspects (*get*) or alters (*set*) variables when it queries an agent. The *get*, *getnext*, and *set* commands are sent from the manager station, and the agent replies once the value is obtained or altered (see [Figure 2](#)). Agents use variables to report such data as status, the number of bytes and packets in and out of the device, and the number of broadcast messages sent and received. These variables are also known as *managed objects*. All managed objects are contained in the MIB.



**Figure 2: SNMP Query**

When passive, the manager station receives an unsolicited message (trap) from the switch agent if an unusual event occurs. See [Figure 3](#) and “[Traps](#)” on page 35 for more information.



**Figure 3: SNMP Trap**

The agent can receive queries from one or more manager stations and can send traps to up to six manager stations.

[Figure 4](#) shows a typical SNMP SAN.



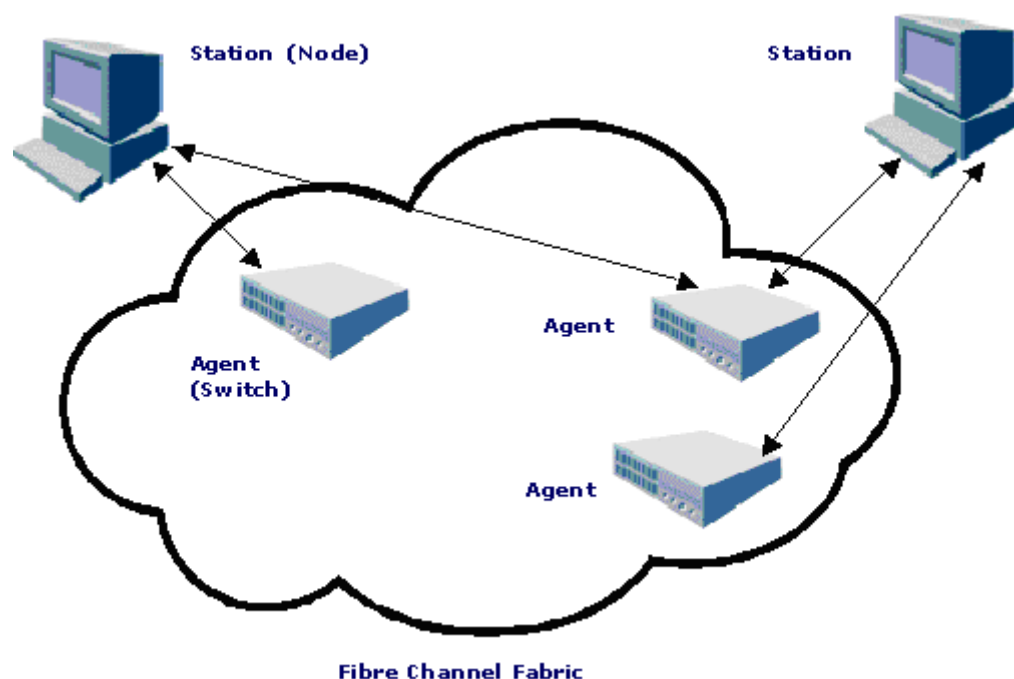
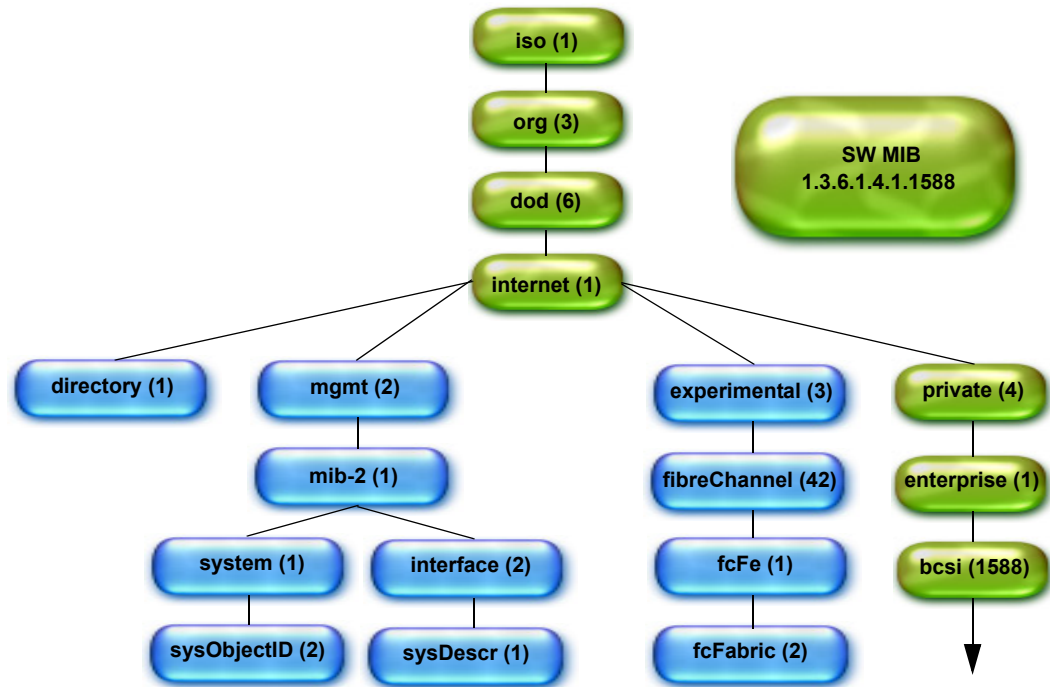


Figure 4: SNMP SAN

## Understanding MIBs

The MIB structure can be represented by a tree hierarchy. The root splits into three main branches: International Organization for Standardization (ISO), Consultative Committee for International Telegraph and Telephone (CCITT), and joint ISO/CCITT. These branches and their leaves have short text strings and integers to identify them. Text strings describe object names, while integers allow software to create compact, encoded representations of the names.

Each MIB variable is assigned an object identifier (OID). The OID is the sequence of numeric labels on the nodes along a path from the root to the object. For example, as shown in [Figure 5](#), the SW.MIB OID is 1.3.6.1.4.1.1588, the corresponding name is `iso.org.dod.internet.private.enterprise.bsci`. The other branches are part of the standard MIBs, and the portions relevant to configuring SNMP on an HP StorageWorks switch are referenced in the remainder of this user guide.



**Figure 5: MIB Tree Location**

Use a MIB browser to access the MIB variables; all MIB browsers perform queries and load MIBs. Since different vendors vary the information in their private enterprise MIBs, it is necessary to verify their information. The Fibre Channel MIB standards dictate that certain information be included in all MIBs; it is the vendors responsibility to follow the standards. These standards are:

- **FibreAlliance (FA) MIB:** HP supports version 3.0.
- **Fabric Element (FE) MIB:** recently accepted by the Internet Engineering Task Force (IETF).

HP supports the experimental version and, in Fabric OS v4.2.x, the IETF-accepted version now located under the MIB-II branch. This latest version of the FE MIB references the `FRAMEWORK.MIB` and, based on the MIB browser, it is necessary to load this MIB before the `FE.MIB`. See “[Loading MIBs](#)” on page 35 for more information.

Once loaded, the `MAX-ACCESS` variable in the MIB represents a concept of community between the agent and management station. The community allows for the following states:

- Not-accessible, which means that you cannot read or write to this variable.
- Read-create, which specifies a tabular object that can be read, modified, or created as a new row in a table.
- Read-only, which means that the community is *public* and the variable is used only to monitor information.
- Read-write, which means that the community is *private* and you can read or modify this variable.

## Traps

An unsolicited message that comes to the manager station from the SNMP agent on the device is called a *trap*. HP StorageWorks switches send traps out on UDP port 162 only.

See [Table 2](#) for the six traps defined in the TRP .MIB, when it occurs, and how to configure the trap, if possible.

**Table 2: TRP MIB File Traps**

| Name                       | Specific | When                             | Configure                                    |
|----------------------------|----------|----------------------------------|--|
| swFault<br>(not supported) | 1        | During boot, if diagnostics fail | Always on                                    |
| swSensorSen                | 2        | Obsolete                         | NA   |
| swPortSen                  | 3        | Port changes state               | Always on                                    |
| swEventTrap                | 4        | Switch event                     | Command: agtCfgSet<br>Variable: swEventLevel |
| swFabricWatch              | 5        | Threshold breached               | Command: fwConfigure                         |
| swTrackChanges             | 6        | Login and logout                 | Command:<br>swTrackChanges                   |

**Note:** The swEventTrap (specific trap 4) configures using the agtCfgSet command. The manager station receives other traps even if swEventTrap is off. Use the snmpMibCapSet command to turn swTraps on and off.

## Loading MIBs

The HP StorageWorks MIB is a set of variables that are private extensions to the Internet standard MIB-II. The MIB standard is documented in Request for Comment (RFC) 1213., *Management Information Base for Network Management of TCP/IP-based Internets: MIB-II*. The agents support many other Internet-standard MIBs. These standard MIBs are defined in RFC publications. To find specific MIB information, examine the propriety MIB structure and the standard RFC MIBs supported by HP.

This section describes the requirements and dependencies when loading MIBs. There are two sections:

- “[Before Loading MIBs](#)” on page 35
- “[MIB Loading Order](#)” on page 36

### Before Loading MIBs

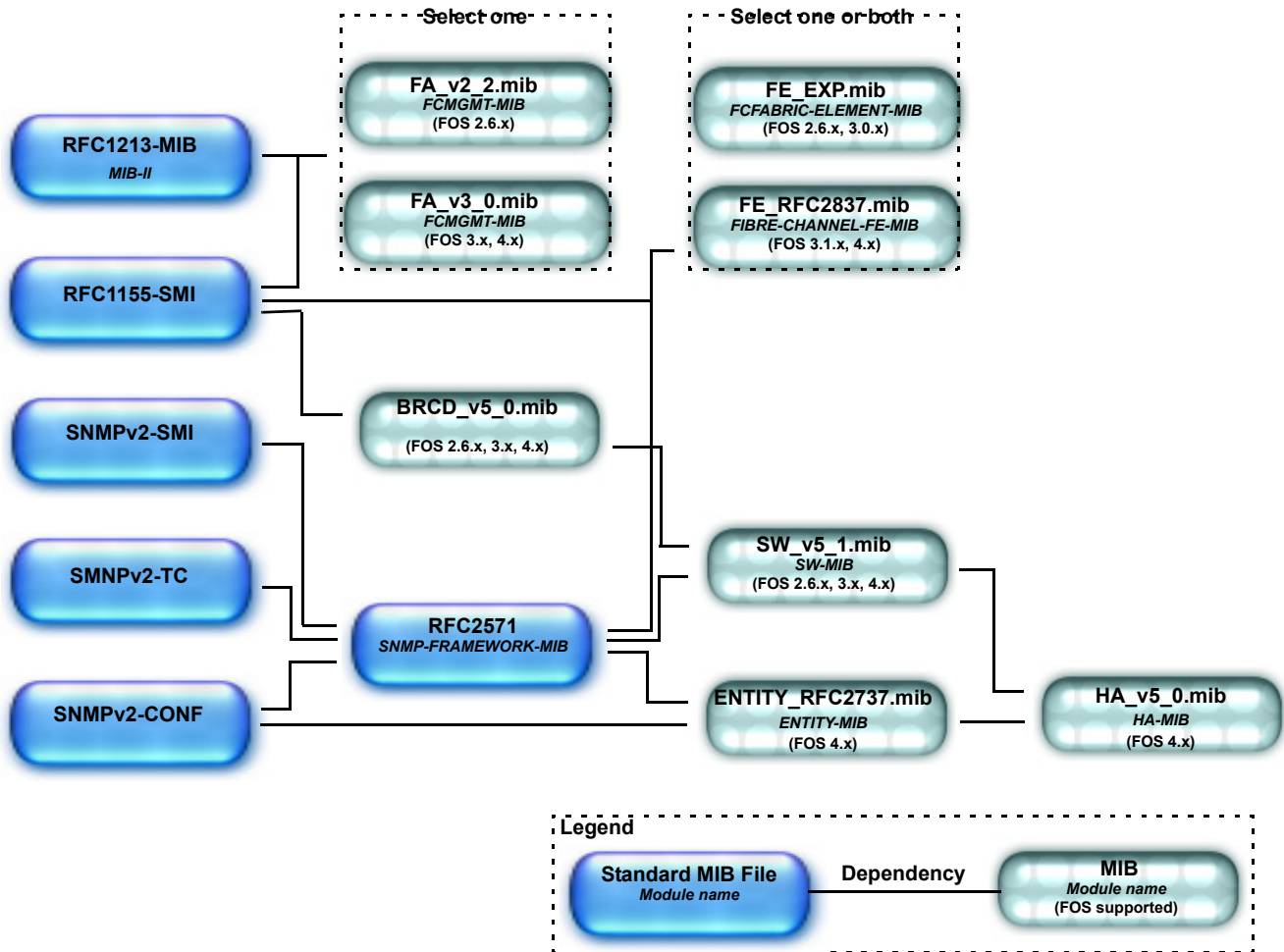
Before loading HP StorageWorks MIB files, make sure you have the correct version of SNMP for your Fabric OS version (see [Table 3](#)).

**Table 3: Fabric OS Supported SNMP Versions**

| Fabric OS  | SNMPv1 | SNMPv2 | SNMPv3 |
|--|--------|--------|--------|
| v2.6.1 and previous  | Yes    | Yes*   | No     |
| v3.1.0 and previous  | Yes    | Yes*   | No     |
| v4.1.0 and previous  | Yes    | No     | No     |
| v2.6.1 and previous  | Yes    | Yes*   | No     |
| v3.1.0 and previous  | Yes    | Yes*   | No     |
| v4.2.x and previous  | Yes    | No     | No     |
| * The corresponding Fabric OS has SNMPv2 capabilities, but is not supported. |        |        |        |

## MIB Loading Order

Many MIBs use definitions that are defined in other MIBs. These definitions are listed in the **IMPORTS** sections near the top of the MIB. When loading the MIBs, see [Figure 6](#) to ensure that any MIB dependencies are loaded in the correct order.



**Figure 6: SNMP MIB Dependencies and Advised Installation Order**

**Note:** The FA\_v3\_0.mib obsoletes the use of the `connUnitPortStatFabricTable` used in the FA\_v2\_2.mib. It now uses the `connUnitPortStatTable` for port statistics. The FA\_v3\_0.mib and the FA\_v2\_2.mib cannot be loaded concurrently on the same SNMP management system.

The FE\_RFC2837.mib and the FE\_EXP.mib can be loaded concurrently on the same SNMP management system. The FE\_EXP.mib was listed in the experimental OID section. The FE\_RFC2837.mib has subsequently been ratified by the standards organizations.

All Fabric OSs support SNMPv1. Fabric v2.6.x and v3.1.x partially support SNMPv2, but not v4.x.



# MIB-II (RFC1213-MIB)

## 2

This chapter provides descriptions and other information specific to MIB-II and discusses the following major topics:

- [Overview](#), page 40
- [System Group](#), page 44
- [Interfaces Group](#), page 45
- [Address Translation Group](#), page 50
- [IP Group](#), page 51
- [ICMP Group](#), page 59
- [TCP Group](#), page 62
- [UDP Group](#), page 65
- [EGP Group](#), page 66
- [Transmission Group](#), page 67
- [SNMP Group](#), page 67

## Overview

The descriptions of the MIB variables in this chapter come directly from the MIB-II itself. The objects in MIB-II are organized into the following groups:

- System Group
- Interfaces Group
- Address Translation Group
- IP Group
- ICMP Group
- TCP Group
- UDP Group
- EGP Group
- Transmission Group
- SNMP Group

## MIB-II Object Hierarchy

Figure 7 through Figure 10 show the organization and structure of MIB-II.

```
- iso (1)
  - org (3)
    - dod (6)
      - internet (1)
        - directory (1)
        - mgmt (2)
          - mib-2 (1)
            - system (1)
            - interfaces (2)
            - at (3)
            - ip (4)
            - icmp (5)
            - tcp (6)
            - udp (7)
            - egp (8)
            - transmission (10)
            - snmp (11)
```

**Figure 7: MIB-II Overall Tree Structure**



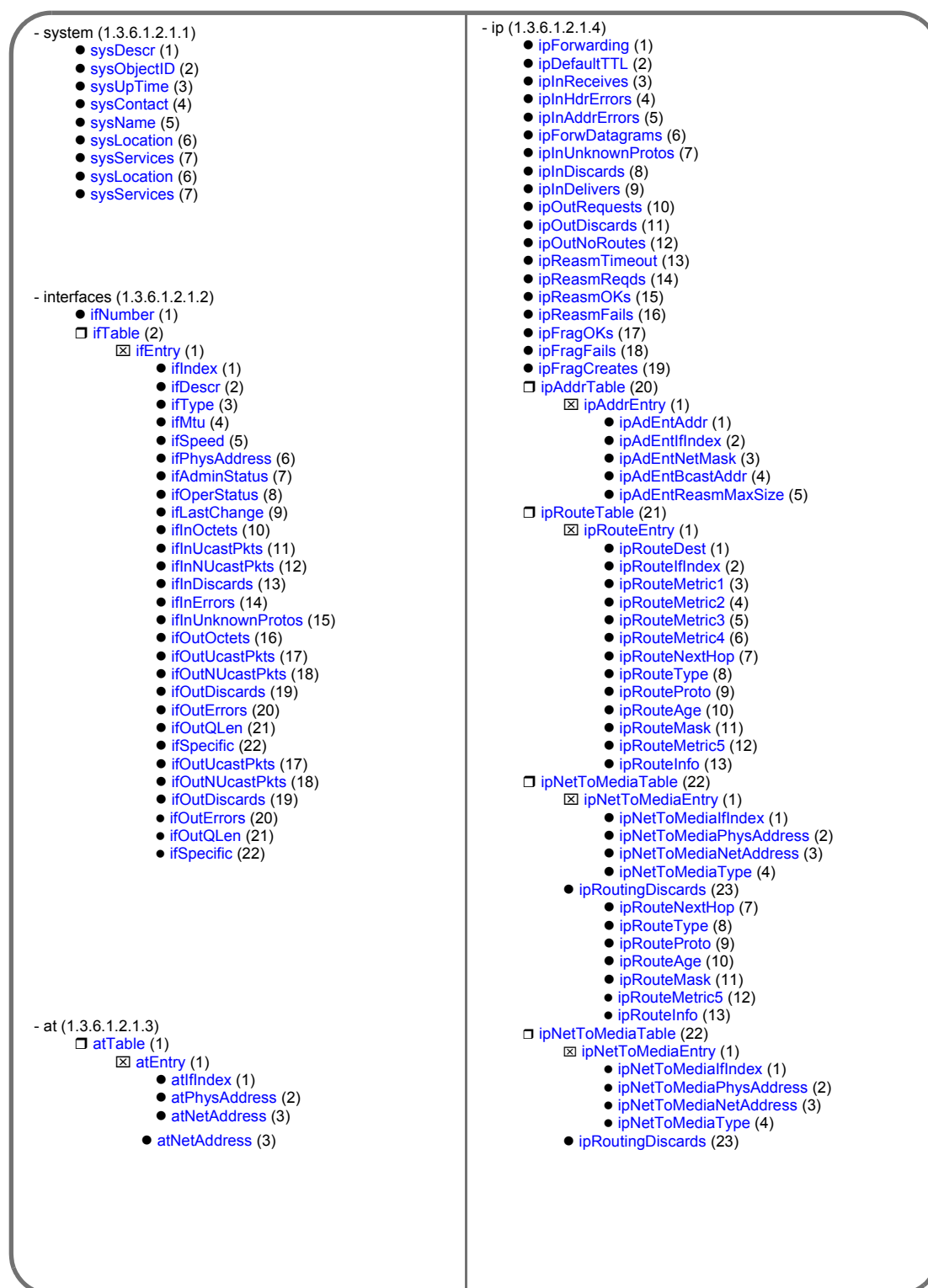


Figure 8: Tree Structure for MIB-II System, Interfaces, AT, and IP Groups

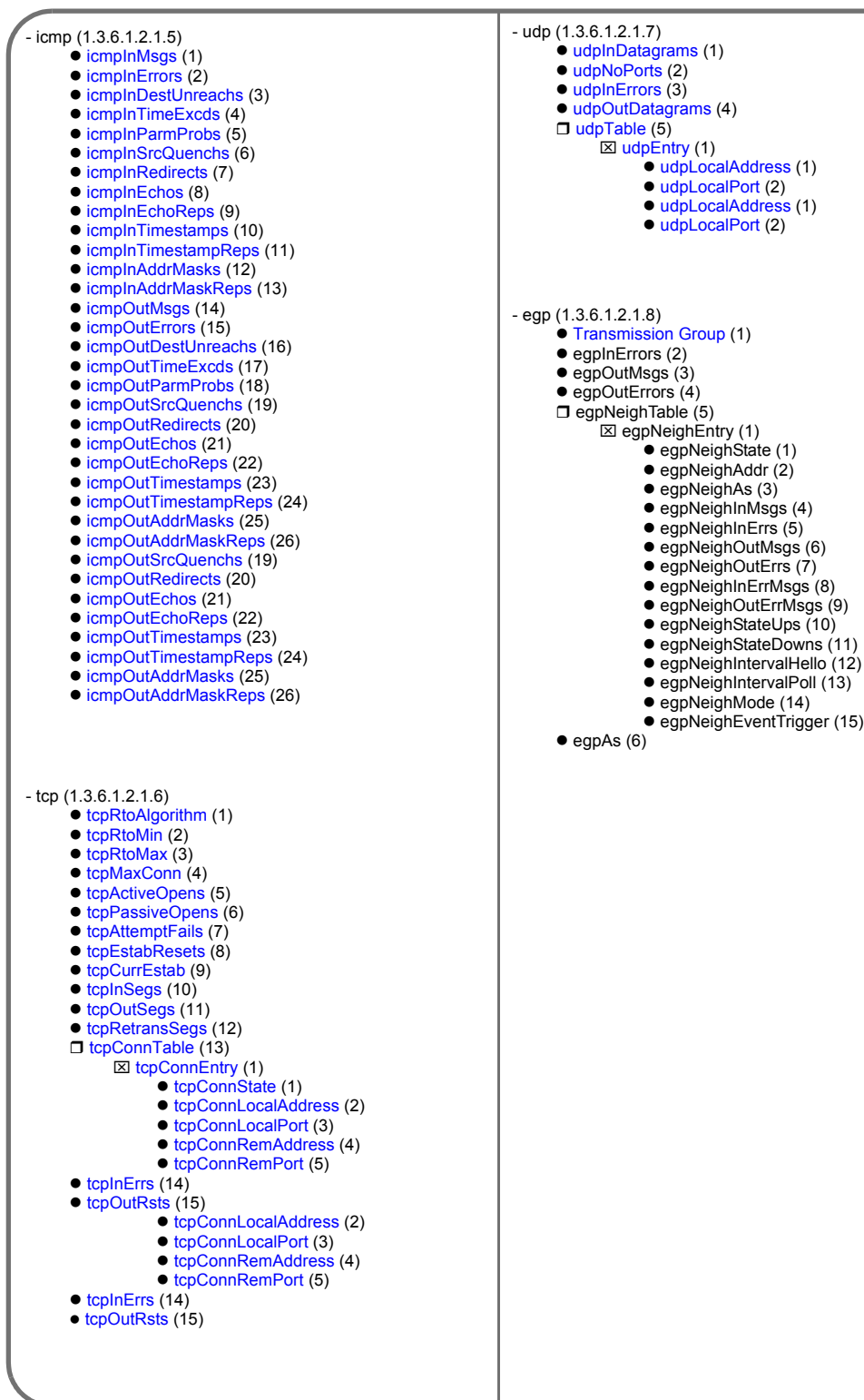


Figure 9: Tree Structure for MIB-II ICMP, TCP, UDP, and EGP Groups

```

- snmp (1.3.6.1.2.1.11)
  ● snmpInPkts (1)
  ● snmpOutPkts (2)
  ● snmpInBadVersions (3)
  ● snmpInBadCommunityNames (4)
  ● snmpInBadCommunityUses (5)
  ● snmpInASNParseErrs (6)
  ● snmpInTooBigs (8)
  ● snmpInNoSuchNames (9)
  ● snmpInBadValues (10)
  ● snmpInReadOnly (11)
  ● snmpInGenErrs (12)
  ● snmpInTotalReqVars (13)
  ● snmpInTotalSetVars (14)
  ● snmpInGetRequests (15)
  ● snmpInGetNexts (16)
  ● snmpInSetRequests (17)
  ● snmpInGetResponses (18)
  ● snmpInTraps (19)
  ● snmpOutTooBigs (20)
  ● snmpOutNoSuchNames (21)
  ● snmpOutBadValues (22)
  ● snmpOutGenErrs (24)
  ● snmpOutGetRequests (25)
  ● snmpOutGetNexts (26)
  ● snmpOutSetRequests (27)
  ● snmpOutGetResponses (28)
  ● snmpOutTraps (29)
  ● snmpEnableAuthenTraps (30)
  ● snmpOutBadValues (22)
  ● snmpOutGenErrs (24)
  ● snmpOutGetRequests (25)
  ● snmpOutGetNexts (26)
  ● snmpOutSetRequests (27)
  ● snmpOutGetResponses (28)
  ● snmpOutTraps (29)
  ● snmpEnableAuthenTraps (30)

```

**Figure 10: Tree Structure for MIB-II SNMP Group**

## Text Conventions

Table 4 specifies the conventions in MIB-II.

**Table 4: MIB-II Text Conventions**

| Type Definition | Value                         |
|-----------------|-------------------------------|
| DisplayString   | Octet String of size 0 to 255 |
| PhysAddress     | Octet String                  |

## Imports

The following objects and types are imported from RFC1155-SMI:

- Mgmt
- NetworkAddress
- IpAddress
- Counter
- Gauge
- TimeTicks

## System Group

All systems must implement the System Group. If an agent is not configured to have a value for any of the System Group variables, a string of length 0 is returned.

### **sysDescr**

OID 1.3.6.1.2.1.1.1

Description A textual description of the entity.

Note This value should include the full name and version identification of the hardware type, software operating system, and networking software. This must contain only printable ASCII characters.

Default Value = Fibre Channel Switch. Set this value using the `agtCfgSet` Telnet command.

### **sysObjectID**

OID 1.3.6.1.2.1.1.2

Description The vendor's authoritative identification of the network management subsystem contained in the entity.

Note This value is allocated within the Structure of Management Information (SMI) enterprises subtree (1.3.6.1.4.1) and provides an easy and unambiguous means for determining what kind of device is being managed.

Example:

If vendor NetYarn, Inc. is assigned the subtree 1.3.6.1.4.1.4242, it could assign the identifier 1.3.6.1.4.1.4242.1.1 to its Knit Router.

Default value =

```
iso.org.dod.internet.private.enterprises.bcsi.commDev.fibrechannel.fcSwitch.sw
```

### **sysUpTime**

OID 1.3.6.1.2.1.1.3

Description The time (in hundredths of a second) since the network management portion of the system was last reinitialized.

### **sysContact**

OID 1.3.6.1.2.1.1.4

Description The textual identification of the contact person for this managed node, together with information on how to contact this person.

Note Default value = Field Support. Set this value using the `agtCfgSet` Telnet command.

### **sysName**

OID 1.3.6.1.2.1.1.5

|                    |  |
|--------------------|--|
| Description        | An administratively-assigned name for this managed node. By convention, this is the node's fully qualified domain name.  |
| Note               | Default value = <i>preassigned name of the switch</i> .  |
| <b>sysLocation</b> |  |
| OID                | 1.3.6.1.2.1.1.6  |
| Description        | The physical location of this node (for example, telephone closet, 3rd floor).   |
| Note               | Default value = End User Premise. Set this value using the <code>agtCfGSet</code> Telnet command.  |
| <b>sysServices</b> |  |
| OID                | 1.3.6.1.2.1.1.7  |
| Description        | <p>A value that indicates the set of services that this entity primarily offers.</p> <p>The value is a sum. This sum initially takes the value 0. Then, for each layer, L, in the range 1 through 7, for which this node performs transactions, 2 raised to the power (L - 1) is added to the sum. For example, a node that primarily performs routing functions has a value of 4 (<math>2^{3-1}</math>). In contrast, a node that is a host and offers application services has a value of 72 (<math>2^{4-1} + 2^{7-1}</math>). Note that in the context of the Internet suite of protocols, values should be calculated accordingly:</p> <p>Layer functionality</p> <p>1 = physical (for example, repeaters)</p> <p>2 = datalink and subnetwork (for example, bridges)</p> <p>3 = internet (for example, IP gateways)</p> <p>4 = end-to-end (for example, IP hosts)</p> <p>7 = applications (for example, mail relays)</p> |
| Note               | For systems including OSI protocols, layers 5 and 6 also can be counted. The return value is always 79.  |

## Interfaces Group

Implementation of the Interfaces group is mandatory for all systems.

### ifNumber

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.2.1   |
| Description | The number of network interfaces (regardless of their current state) present on this system.  |
| Note        | When running FCIP, the return value is 5 for the SAN Director 2/128, 7 for Core Switch 2/64, and 3 for SAN Switch 2/32. The value can be 2 or 3 for all other switch types. |

## Interfaces Table

The Interfaces table contains information on the entity's interfaces. Each interface is thought of as being attached to a subnetwork. Note that this term should not be confused with *subnet*, which refers to an address partitioning scheme used in the Internet suite of protocols.

### ifTable

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.2.2   |
| Description | A list of interface entries. The number of entries is given by the value of ifNumber.   |
| Note        | The ifDescr for SAN Switch 2/32 includes lo, eth0, and fc0. The ifDescr for Core Switch 2/64 and SAN Director 2/128 switches includes lo, eth0, fc0, fc1, eth0:1, and eth0:2. |

### ifEntry

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.2.2.1  |
| Description | An interface entry containing objects at the subnetwork layer and below, for a particular interface. |
| Index       | ifIndex  |

### ifIndex

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.2.2.1.1   |
| Description | A unique value for each interface.  |
| Note        | The values range from 1 to the value of ifNumber. The value for each interface must remain constant, at least from one reinitialization of the entity's network management system to the next reinitialization.<br><br>For example, the number of entries inside the Core Switch 2/64 and SAN Director 2/128 switches are 1 to 3 for FCIP; otherwise, the value is 1 or 2 |

### ifDescr

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.2.2.1.2  |
| Description | A textual string containing information about the interface.   |
| Note        | For example, Core Switch 2/64 and SAN Director 2/128: fei0, lo0, fc0. Also, eth0 for Fabric OS v4.x. |

### ifType

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.2.2.1.3   |
| Description | The type of interface, designated by the physical link protocols immediately below the network layer in the protocol stack. |
| Note        | fei0 maps to 6 (Ethernet-csmacd).<br>lo0 maps to 24 (softwareLoopback).<br>fc0 maps to 56.                                  |

**ifMtu**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.2.2.1.4   |
| Description | The size of the largest datagram that can be sent and received on the interface, specified in octets.   |
| Note        | For interfaces transmit network datagrams, the value is the size of the largest network datagram that can be sent on the interface (these values are different for Fabric OS v4.x).<br><br>fei0 returns 1500.<br>lo0 returns 3904.<br>fc0 returns 2024. |

**ifSpeed**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.2.2.1.5   |
| Description | An estimate (in bits per second) of the interface's current bandwidth.  |
| Note        | For interfaces that do not vary in bandwidth or interfaces for which no accurate estimation can be made, this object should contain the nominal bandwidth. For Fabric OS v4.x, 2 GB returns.<br><br>fei0 returns $10^7$ .<br>lo0 returns 0.<br>fc0 returns $10^9$ . |

**ifPhysAddress**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.2.2.1.6   |
| Description | The interface's address at the protocol layer immediately below the network layer in the protocol stack.  |
| Note        | For interfaces that do not have such an address (a serial line, for example), this object should contain an octet string of zero length.<br><br>fei0 returns MAC address of the Ethernet.<br>lo0 returns null.<br>fc0 returns MAC address of the Fibre Channel. |

**ifAdminStatus**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.2.2.1.7  |
| Description | The desired state of the interface.  |
| Note        | The 3 state (testing) indicates that no operational packets can be passed. This object is read-only in Fabric OS v4.x. |

**ifOperStatus**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.2.2.1.8                             |
| Description | The current operational state of the interface. |

Note The 3 state (testing) indicates that no operational packets can be passed.

**ifLastChange**

OID 1.3.6.1.2.1.2.2.1.9

Description The value of sysUpTime at the time the interface entered its current operational state. If the current state was entered before the last reinitialization of the local network management subsystem, this object contains a zero value.

**ifInOctets**

OID 1.3.6.1.2.1.2.2.1.10

Description The total number of octets received on the interface, including framing characters.

**ifInUcastPkts**

OID 1.3.6.1.2.1.2.2.1.11

Description The number of subnetwork-unicast packets delivered to a higher-layer protocol.

**ifInNUcastPkts**

OID 1.3.6.1.2.1.2.2.1.12

Description The number of nonunicast packets (for example, subnetwork-broadcast or subnetwork-multicast) delivered to a higher-layer protocol.

**ifInDiscards**

OID 1.3.6.1.2.1.2.2.1.13

Description The number of inbound packets that were chosen to be discarded (even though no errors had been detected) to prevent their being delivered to a higher-layer protocol.

Note One possible reason for discarding such a packet could be to free buffer space.

**ifInErrors**

OID 1.3.6.1.2.1.2.2.1.14

Description The number of inbound packets that contained errors, which thereby prevent them from being delivered to a higher-layer protocol.

**ifInUnknownProtos**

OID 1.3.6.1.2.1.2.2.1.15

Description The number of packets received by way of the interface that were discarded because of an unknown or unsupported protocol.

**ifOutOctets**

OID 1.3.6.1.2.1.2.2.1.16



|             |  |
|-------------|--|
| Description | The total number of octets transmitted out of the interface, including framing characters. |
|-------------|--|

**ifOutUcastPkts**

|     |                      |
|-----|----------------------|
| OID | 1.3.6.1.2.1.2.2.1.17 |
|-----|----------------------|

|             |   |
|-------------|---|
| Description | The total number of packets that were requested, by higher-level protocols, to be transmitted to a subnetwork-unicast address, including those that were discarded or not sent. |
|-------------|---|

**ifOutNUcastPkts**

|     |                      |
|-----|----------------------|
| OID | 1.3.6.1.2.1.2.2.1.18 |
|-----|----------------------|

|             |   |
|-------------|---|
| Description | The total number of packets that were requested by higher-level protocols to be transmitted to a nonunicast address (for example, a subnetwork-broadcast or subnetwork-multicast), including those that were discarded or not sent. |
|-------------|---|

**ifOutDiscards**

|     |                      |
|-----|----------------------|
| OID | 1.3.6.1.2.1.2.2.1.19 |
|-----|----------------------|

|             |   |
|-------------|---|
| Description | The number of outbound packets that were chosen to be discarded (even though no errors had been detected) to prevent their being transmitted. One possible reason for discarding such a packet is to free buffer space. |
|-------------|---|

**ifOutErrors**

|     |                      |
|-----|----------------------|
| OID | 1.3.6.1.2.1.2.2.1.20 |
|-----|----------------------|

|             |   |
|-------------|---|
| Description | The number of outbound packets that could not be transmitted because of errors. |
|-------------|---|

**ifOutQlen**

|     |                      |
|-----|----------------------|
| OID | 1.3.6.1.2.1.2.2.1.21 |
|-----|----------------------|

|             |   |
|-------------|---|
| Description | The length of the output packet queue (in packets). |
|-------------|---|

**ifSpecific**

|     |                      |
|-----|----------------------|
| OID | 1.3.6.1.2.1.2.2.1.22 |
|-----|----------------------|

|             |  |
|-------------|--|
| Description | A reference to MIB definitions specific to the medium used to realize the interface. |
|-------------|--|

For example, if the interface is realized by an Ethernet, the value of this object refers to a document that defines objects specific to Ethernet. If this information is not present, its value should be set to the Object Identifier 0 0, which is a syntactically valid object identifier, and any conformant implementation of ASN.1 and BER must be able to generate and recognize this value.

|      |  |
|------|--|
| Note | fei0 returns null OID.<br>lo0 returns null OID.<br>fc0 returns null OID. |
|------|--|

## Address Translation Group

Implementation of the Address Translation group is mandatory for all systems. Note, however, that this group is deprecated by MIB-II. From MIB-II onward, each network protocol group contains its own address translation tables.

### Address Translation Table

The Address Translation group contains one table, which is the union across all interfaces of the translation tables for converting a network address (an IP address, for example) into a subnetwork-specific address. This document refers to such a subnetwork-specific address as a *physical address*.

For example, for broadcast media where ARP is in use the translation table is equivalent to the ARP cache. On an X.25 network, where nonalgorithmic translation to X.121 addresses is required, the translation table contains the network address to X.121 address equivalences.

#### **atTable**

OID 1.3.6.1.2.1.3.1

Description The Address Translation tables contain the network address to physical address equivalences. Some interfaces do not use translation tables for determining address equivalences (for example, DDN-X.25 has an algorithmic method). If all interfaces are of this type, the Address Translation table is empty.

#### **atEntry**

OID 1.3.6.1.2.1.3.1.1

Description Each entry contains one network address to physical address equivalence.

Index atIfIndex, atNetAddress

#### **atIfIndex**

OID 1.3.6.1.2.1.3.1.1.1

Description The interface on which this entry's equivalence is effective. The interface identified by a specific value of this index is the same interface identified by the same value of ifIndex.

#### **atPhysAddress**

OID 1.3.6.1.2.1.3.1.1.2

Description The media-dependent physical address.

#### **atNetAddress**

OID 1.3.6.1.2.1.3.1.1.3

Description The network address (the IP address, for example) corresponding to the media-dependent physical address.

## IP Group

Implementation of the IP group is mandatory for all systems.

### **ipForwarding**

OID 1.3.6.1.2.1.4.1

Description The indication whether this entity is acting as an IP gateway with respect to the forwarding of datagrams received by, but not addressed to, this entity. IP gateways forward datagrams; IP hosts do not (except those source-routed through the host).

### **ipDefaultTTL**

OID 1.3.6.1.2.1.4.2

Description The default value inserted into the time-to-live field of the IP header of datagrams originated at this entity, whenever a TTL value is not supplied by the transport layer protocol.

### **ipInReceives**

OID 1.3.6.1.2.1.4.3

Description The total number of input datagrams received from interfaces, including those received in error.

### **ipInHdrErrors**

OID 1.3.6.1.2.1.4.4

Description The number of input datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, and so on.

### **ipInAddrErrors**

OID 1.3.6.1.2.1.4.5

Description The number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity. This count includes invalid addresses (for example, 0 . 0 . 0 . 0) and addresses of unsupported classes (Class E, for example). For entities that are not IP gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.

### **ipForwDatagrams**

OID 1.3.6.1.2.1.4.6

Description The number of input datagrams for which this entity is not the final IP destination, as a result of which an attempt was made to find a route to forward them to that final destination. In entities that do not act as IP gateways, this counter includes only those packets that were source-routed through this entity, and the Source-Route option processing was successful.

**ipInUnknownProtos**

OID 1.3.6.1.2.1.4.7

Description The number of locally addressed datagrams received successfully, but discarded because of an unknown or unsupported protocol.

**ipInDiscards**

OID 1.3.6.1.2.1.4.8

Description The number of input IP datagrams for which no problems are encountered to prevent their continued processing, but which were discarded (for example, for lack of buffer space).

Note This counter does not include any datagrams discarded while awaiting reassembly.

**ipInDelivers**

OID 1.3.6.1.2.1.4.9

Description The total number of input datagrams successfully delivered to IP user protocols (including ICMP).

**ipOutRequests**

OID 1.3.6.1.2.1.4.10

Description The total number of IP datagrams that local IP user protocols (including ICMP) supplied to IP in requests for transmission. Note that this counter does not include any datagrams counted in ipForwDatagrams.

**ipOutDiscards**

OID 1.3.6.1.2.1.4.11

Description The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (for example, for lack of buffer space).

Note This counter would include datagrams counted in ipForwDatagrams if any such packets met this (discretionary) discard criterion.

**ipOutNoRoutes**

OID 1.3.6.1.2.1.4.12

Description The number of IP datagrams discarded because no route could be found to transmit them to their destination.

Note This counter includes any packets counted in ipForwDatagrams that meet this no-route criterion. Note that this includes any datagrams that a host cannot route because all of its default gateways are down.

**ipReasmTimeout**

OID 1.3.6.1.2.1.4.13

|             |   |
|-------------|---|
| Description | The maximum number of seconds that received fragments are held while they are awaiting reassembly at this entity. |
|-------------|---|

**ipReasmReqds**

|     |                  |
|-----|------------------|
| OID | 1.3.6.1.2.1.4.14 |
|-----|------------------|

|             |   |
|-------------|---|
| Description | The number of IP fragments received that needed to be reassembled at this entity. |
|-------------|---|

**ipReasmOKs**

|     |                  |
|-----|------------------|
| OID | 1.3.6.1.2.1.4.15 |
|-----|------------------|

|             |  |
|-------------|--|
| Description | The number of IP datagrams successfully reassembled. |
|-------------|--|

**ipReasmFails**

|     |                  |
|-----|------------------|
| OID | 1.3.6.1.2.1.4.16 |
|-----|------------------|

|             |  |
|-------------|--|
| Description | The number of failures detected by the IP reassembly algorithm (for whatever reason: time out, errors, and so on). |
|-------------|--|

|      |   |
|------|---|
| Note | This is not necessarily a count of discarded IP fragments, because some algorithms (notably the algorithm in RFC 815) can lose track of the number of fragments by combining them as they are received. |
|------|---|

**ipFragOKs**

|     |                  |
|-----|------------------|
| OID | 1.3.6.1.2.1.4.17 |
|-----|------------------|

|             |   |
|-------------|---|
| Description | The number of IP datagrams that have successfully been fragmented at this entity. |
|-------------|---|

**ipFragFails**

|     |                  |
|-----|------------------|
| OID | 1.3.6.1.2.1.4.18 |
|-----|------------------|

|             |  |
|-------------|--|
| Description | The number of IP datagrams that have been discarded because they needed to be fragmented at this entity but could not be (for example, because their Don't Fragment flag was set). |
|-------------|--|

**ipFragCreates**

|     |                  |
|-----|------------------|
| OID | 1.3.6.1.2.1.4.19 |
|-----|------------------|

|             |   |
|-------------|---|
| Description | The number of IP datagram fragments that have been generated as a result of fragmentation at this entity. |
|-------------|---|

## IP Address Table

The IP address table contains this entity's IP addressing information.

**ipAddrTable**

|     |                  |
|-----|------------------|
| OID | 1.3.6.1.2.1.4.20 |
|-----|------------------|

|             |   |
|-------------|---|
| Description | The table of addressing information relevant to this entity's IP addresses. |
|-------------|---|

**ipAddrEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.4.20.1  |
| Description | The addressing information for one of this entity's IP addresses. |
| Index       | ipAdEntAddr   |

**ipAdEntAddr**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.4.20.1.1  |
| Description | The IP address to which this entry's addressing information pertains. |

**ipAdEntIfIndex**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.4.20.1.2  |
| Description | The index value that uniquely identifies the interface to which this entry is applicable. The interface identified by a value of this index is the same interface as identified by the same value of ifIndex. |

**ipAdEntNetMask**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.4.20.1.3  |
| Description | The subnet mask associated with the IP address of this entry. The value of the mask is an IP address with all the network bits set to 1 and all the host bits set to 0. |

**ipAdEntBcastAddr**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.4.20.1.4   |
| Description | The value of the least-significant bit in the IP broadcast address used for sending datagrams on the (logical) interface associated with the IP address of this entry. For example, when the Internet standard all-ones broadcast address is used, the value is 1. This value applies to both the subnet and network broadcast addresses used by the entity on this (logical) interface. |

**ipAdEntReasmMaxSize**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.4.20.1.5  |
| Description | The size of the largest IP datagram that this entity can reassemble from incoming IP fragmented datagrams received on this interface. |

## IP Routing Table

The IP routing table contains an entry for each route currently known to this entity.

**ipRouteTable**

|             |                                 |
|-------------|---------------------------------|
| OID         | 1.3.6.1.2.1.4.21                |
| Description | This entity's IP routing table. |

**ipRouteEntry**

OID 1.3.6.1.2.1.4.21.1

Description A route to a particular destination.

Index ipRouteDest

**ipRouteDest**

OID 1.3.6.1.2.1.4.21.1.1

Description The destination IP address of this route.

Note An entry with a value of 0.0.0.0 is considered a default route. Multiple routes to a single destination can appear in the table, but access to such multiple entries is dependent on the table-access mechanisms defined by the network management protocol in use.

**ipRouteIfIndex**

OID 1.3.6.1.2.1.4.21.1.2

Description The index value that uniquely identifies the local interface through which the next hop of this route should be reached.

Note The interface identified by a particular value of this index is the same interface identified by the same value of ifIndex.

**ipRouteMetric1**

OID 1.3.6.1.2.1.4.21.1.3

Description The primary routing metric for this route.

Note The semantics of this metric are determined by the routing protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1.

**ipRouteMetric2**

OID 1.3.6.1.2.1.4.21.1.4

Description An alternate routing metric for this route.

Note The semantics of this metric are determined by the routing protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1.

**ipRouteMetric3**

OID 1.3.6.1.2.1.4.21.1.5

Description An alternate routing metric for this route.

Note The semantics of this metric are determined by the routing protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1.

**ipRouteMetric4**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.4.21.1.6  |
| Description | An alternate routing metric for this route.   |
| Note        | The semantics of this metric are determined by the routing protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1. |

**ipRouteNextHop**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.4.21.1.7  |
| Description | The IP address of the next hop of this route. (In the case of a route bound to an interface that is realized via a broadcast media, the value of this field is the agent's IP address on that interface.) |

**ipRouteType**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.4.21.1.8  |
| Description | <p>The type of route. Valid values are:</p> <ul style="list-style-type: none"><li>other (1) None of the following</li><li>invalid (2) An invalidated route—route to directly</li><li>direct (3) Connected (sub)network—route to a non-local</li><li>indirect (4) Host, network, and subnetwork</li></ul> <p>Setting this object to 2 (invalid) has the effect of invalidating the corresponding entry in the ipRouteTable object. That is, it effectively disassociates the destination identified with that entry from the route identified with the entry. It is an implementation-specific matter whether the agent removes an invalidated entry from the table. Accordingly, management stations must be prepared to receive tabular information from agents that corresponds to entries not currently in use. Proper interpretation of such entries requires examination of the relevant ipRouteType object.</p> |
| Note        | The values direct (3) and indirect (4) refer to the notion of direct and indirect routing in the IP architecture.   |

**ipRouteProto**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.4.21.1.9  |
| Description | The routing mechanism by which this route was learned.  |
| Note        | Inclusion of values for gateway routing protocols is not intended to imply that hosts should support those protocols. |

**ipRouteAge**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.4.21.1.10  |
| Description | The number of seconds since this route was last updated or otherwise determined to be correct.                     |
| Note        | Older semantics cannot be implied except through knowledge of the routing protocol by which the route was learned. |



**ipRouteMask**

OID 1.3.6.1.2.1.4.21.1.11

Description The mask to be logical-ANDed with the destination address before being compared to the value in the ipRouteDest field. For those systems that do not support arbitrary subnet masks, an agent constructs the value of the ipRouteMask by determining whether the value of the corresponding ipRouteDest field belongs to a class-A, B, or C network, and then using one of the following:

| mask          | network |
|---------------|---------|
| 255.0.0.0     | class-A |
| 255.255.0.0   | class-B |
| 255.255.255.0 | class-C |

If the value of the ipRouteDest is 0.0.0.0 (default route), then the mask value is also 0.0.0.0.

Note All IP routing subsystems implicitly use this mechanism.

**ipRouteMetric5**

OID 1.3.6.1.2.1.4.21.1.12

Description An alternate routing metric for this route.

Note The semantics of this metric are determined by the routing protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1.

**ipRouteInfo**

OID 1.3.6.1.2.1.4.21.1.13

Description A reference to MIB definitions specific to the particular routing protocol that is responsible for this route, as determined by the value specified in the route's ipRouteProto value. If this information is not present, its value should be set to the Object Identifier, 0 0, which is a syntactically valid object identifier; any conformant implementation of ASN.1 and BER must be able to generate and recognize this value.

## IP Address Translation Table

The IP address translation table contains the IpAddress to physical address equivalences. Some interfaces do not use translation tables for determining address equivalences.

**Example:**

DDN-X.25 has an algorithmic method; if all interfaces are of this type, the Address Translation table is empty.

**ipNetToMediaTable**

OID 1.3.6.1.2.1.4.22

Description     The IP Address Translation table used for mapping from IP addresses to physical addresses.

**ipNetToMediaEntry**

OID                1.3.6.1.2.1.4.22.1

Description     Each entry contains one IpAddress to physical address equivalence.

Index             ipNetToMediaIfIndex, ipNetToMediaNetAddress

**ipNetToMediaIfIndex**

OID                1.3.6.1.2.1.4.22.1.1

Description     The interface on which this entry's equivalence is effective.

Note              The interface identified by a particular value of this index is the same interface identified by the same value of ifIndex.

**ipNetToMediaPhysAddress**

OID                1.3.6.1.2.1.4.22.1.2

Description     The media-dependent physical address.

**ipNetToMediaNetAddress**

OID                1.3.6.1.2.1.4.22.1.3

Description     The IpAddress corresponding to the media-dependent physical address.

**ipNetToMediaType**

OID                1.3.6.1.2.1.4.22.1.4

Description     The type of mapping.

## Additional IP Objects

**ipRoutingDiscards**

OID                1.3.6.1.2.1.4.23

Description     The number of routing entries discarded even though they are valid. One possible reason for discarding such an entry could be to free buffer space for other routing entries.

## ICMP Group

Implementation of the ICMP group is mandatory for all systems.

### **icmpInMsgs**

OID 1.3.6.1.2.1.5.1

Description The total number of ICMP messages that the entity received.

Note This counter includes all ICMP messages counted by icmpInErrors.

### **icmpInErrors**

OID 1.3.6.1.2.1.5.2

Description The number of ICMP messages that the entity received but determined to have ICMP-specific errors (bad ICMP checksums, bad length, and so on).

### **icmpInDestUnreachs**

OID 1.3.6.1.2.1.5.3

Description The number of ICMP Destination Unreachable messages received.

### **icmpInTimeExcds**

OID 1.3.6.1.2.1.5.4

Description The number of ICMP Time Exceeded messages received.

### **icmpInParmProbs**

OID 1.3.6.1.2.1.5.5

Description The number of ICMP Parameter Problem messages received.

### **icmpInSrcQuenchs**

OID 1.3.6.1.2.1.5.6

Description The number of ICMP Source Quench messages received.

### **icmpInRedirects**

OID 1.3.6.1.2.1.5.7

Description The number of ICMP Redirect messages received.

### **icmpInEchos**

OID 1.3.6.1.2.1.5.8

Description The number of ICMP Echo (request) messages received.

### **icmpInEchoReps**

OID 1.3.6.1.2.1.5.9

Description The number of ICMP Echo Reply messages received.

**icmpInTimestamps**

OID 1.3.6.1.2.1.5.10

Description The number of ICMP Timestamp (request) messages received.

**icmpInTimestampReps**

OID 1.3.6.1.2.1.5.11

Description The number of ICMP Timestamp Reply messages received.

**icmpInAddrMasks**

OID 1.3.6.1.2.1.5.12

Description The number of ICMP Address Mask Request messages received.

**icmpInAddrMaskReps**

OID 1.3.6.1.2.1.5.13

Description The number of ICMP Address Mask Reply messages received.

**icmpOutMsgs**

OID 1.3.6.1.2.1.5.14

Description The total number of ICMP messages that this entity attempted to send.

Note This counter includes all those counted by icmpOutErrors.

**icmpOutErrors**

OID 1.3.6.1.2.1.5.15

Description The number of ICMP messages that this entity did not send due to problems discovered within ICMP, such as a lack of buffers. This value should not include errors discovered outside the ICMP layer, such as the inability of IP to route the resultant datagram. In some implementations there might be no type of error that contributes to this counter's value.

**icmpOutDestUnreachs**

OID 1.3.6.1.2.1.5.16

Description The number of ICMP Destination Unreachable messages sent.

**icmpOutTimeExcds**

OID 1.3.6.1.2.1.5.17

Description The number of ICMP Time Exceeded messages sent.

**icmpOutParmProbs**

OID 1.3.6.1.2.1.5.18

Description The number of ICMP Parameter Problem messages sent.

**icmpOutSrcQuenchs**

OID 1.3.6.1.2.1.5.19

Description The number of ICMP Source Quench messages sent.

**icmpOutRedirects**

OID 1.3.6.1.2.1.5.20

Description The number of ICMP Redirect messages sent. For a host, this object is always 0, since hosts do not send redirects.

**icmpOutEchos**

OID 1.3.6.1.2.1.5.21

Description The number of ICMP Echo (request) messages sent.

**icmpOutEchoReps**

OID 1.3.6.1.2.1.5.22

Description The number of ICMP Echo Reply messages sent.

**icmpOutTimestamps**

OID 1.3.6.1.2.1.5.23

Description The number of ICMP Timestamp (request) messages sent.

**icmpOutTimestampReps**

OID 1.3.6.1.2.1.5.24

Description The number of ICMP Timestamp Reply messages sent.

**icmpOutAddrMasks**

OID 1.3.6.1.2.1.5.25

Description The number of ICMP Address Mask Request messages sent.

**icmpOutAddrMaskReps**

OID 1.3.6.1.2.1.5.26

Description The number of ICMP Address Mask Reply messages sent.

## TCP Group

Implementation of the TCP group is mandatory for all systems that implement the TCP.

---

**Note:** Instances of object types that represent information about a particular TCP connection are transient; they persist only as long as the connection in question.

---

### tcpRtoAlgorithm

OID 1.3.6.1.2.1.6.1

Description The algorithm to determine the time-out value for retransmitting unacknowledged octets.

### tcpRtoMin

OID 1.3.6.1.2.1.6.2

Description The minimum value permitted by a TCP implementation for the retransmission time-out, measured in milliseconds.

Note More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission time-out. In particular, when the time-out algorithm is 3 (rsre), an object of this type has the semantics of the LBOUND quantity described in RFC 793.

### tcpRtoMax

OID 1.3.6.1.2.1.6.3

Description The maximum value permitted by a TCP implementation for the retransmission time-out, measured in milliseconds.

Note More refined semantics for objects of this type depend on the algorithm used to determine the retransmission time-out. In particular, when the time-out algorithm is 3 (rsre), an object of this type has the semantics of the UBOUND quantity described in RFC 793.

### tcpMaxConn

OID 1.3.6.1.2.1.6.4

Description The limit on the total number of TCP connections the entity can support. In entities where the maximum number of connections is dynamic, this object should contain the value -1.

### tcpActiveOpens

OID 1.3.6.1.2.1.6.5

Description The number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.

### tcpPassiveOpens

OID 1.3.6.1.2.1.6.6

|             |  |
|-------------|--|
| Description | The number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state. |
|-------------|--|

**tcpAttemptFails**

|     |                 |
|-----|-----------------|
| OID | 1.3.6.1.2.1.6.7 |
|-----|-----------------|

|             |   |
|-------------|---|
| Description | The number of times TCP connections have made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections have made a direct transition to the LISTEN state from the SYN-RCVD state. |
|-------------|---|

**tcpEstabResets**

|     |                 |
|-----|-----------------|
| OID | 1.3.6.1.2.1.6.8 |
|-----|-----------------|

|             |  |
|-------------|--|
| Description | The number of times TCP connections have made a direct transition to the CLOSED state from either the ESTABLISHED state or the CLOSE-WAIT state. |
|-------------|--|

**tcpCurrEstab**

|     |                 |
|-----|-----------------|
| OID | 1.3.6.1.2.1.6.9 |
|-----|-----------------|

|             |  |
|-------------|--|
| Description | The number of TCP connections for which the current state is either ESTABLISHED or CLOSE-WAIT. |
|-------------|--|

**tcpInSegs**

|     |                  |
|-----|------------------|
| OID | 1.3.6.1.2.1.6.10 |
|-----|------------------|

|             |   |
|-------------|---|
| Description | The total number of segments received, including those received in error. This count includes segments received on currently established connections. |
|-------------|---|

**tcpOutSegs**

|     |                  |
|-----|------------------|
| OID | 1.3.6.1.2.1.6.11 |
|-----|------------------|

|             |   |
|-------------|---|
| Description | The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets. |
|-------------|---|

**tcpRetransSegs**

|     |                  |
|-----|------------------|
| OID | 1.3.6.1.2.1.6.12 |
|-----|------------------|

|             |   |
|-------------|---|
| Description | The total number of segments retransmitted; that is, the number of TCP segments transmitted containing one or more previously transmitted octets. |
|-------------|---|

## TCP Connection Table

The TCP connection table contains information about this entity's existing TCP connections.

**tcpConnTable**

|     |                  |
|-----|------------------|
| OID | 1.3.6.1.2.1.6.13 |
|-----|------------------|

|             |   |
|-------------|---|
| Description | A table containing TCP connection-specific information. |
|-------------|---|

**tcpConnEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.6.13.1   |
| Description | Information about a particular current TCP connection. An object of this type is transient, in that it ceases to exist when (or soon after) the connection makes the transition to the CLOSED state. |
| Index       | tcpConnLocalAddress, tcpConnLocalPort,<br>tcpConnRemAddress, tcpConnRemPort  |

**tcpConnState**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.6.13.1.1  |
| Description | <p>The state of this TCP connection. Possible values are:</p> <ul style="list-style-type: none"><li>— closed (1)</li><li>— listen (2)</li><li>— synSent (3)</li><li>— synReceived (4)</li><li>— established (5)</li><li>— finWait1 (6)</li><li>— finWait2 (7)</li><li>— closeWait (8)</li><li>— lastAck (9)</li><li>— closing (10)</li><li>— timeWait (11)</li><li>— deleteTCP (12)</li></ul>   |
| Note        | <p>v3.1 and v4.x do not allow the SET operation on this variable.</p> <p>The only value that might be set by a management station is deleteTCP (12). Accordingly, it is appropriate for an agent to return a badValue response if a management station attempts to set this object to any other value.</p> <p>If a management station sets this object to the value delete12 (TCP), then this has the effect of deleting the TCP (as defined in RFC 793) of the corresponding connection on the managed node, resulting in immediate termination of the connection.</p> <p>As an implementation-specific option, an RST segment might be sent from the managed node to the other TCP endpoint (note, however, that RST segments are not sent reliably).</p> |

**tcpConnLocalAddress**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.6.13.1.2  |
| Description | The local IP address for this TCP connection. In the case of a connection in the listen state that is willing to accept connections for any IP interface associated with the node, the value 0.0.0.0 is used. |



**tcpConnLocalPort**

OID 1.3.6.1.2.1.6.13.1.3

Description The local port number for this TCP connection.

**tcpConnRemAddress**

OID 1.3.6.1.2.1.6.13.1.4

Description The remote IP address for this TCP connection.

**tcpConnRemPort**

OID 1.3.6.1.2.1.6.13.1.5

Description The remote port number for this TCP connection.

## Additional TCP Objects

**tcpInErrs**

OID 1.3.6.1.2.1.6.14

Description The total number of segments received in error (for example, bad TCP checksums).

**tcpOutRsts**

OID 1.3.6.1.2.1.6.15

Description The number of TCP segments sent containing the RST flag.

## UDP Group

Implementation of the UDP group is mandatory for all systems that implement the UDP.

**udpInDatagrams**

OID 1.3.6.1.2.1.7.1

Description The total number of UDP datagrams delivered to UDP users.

**udpNoPorts**

OID 1.3.6.1.2.1.7.2

Description The total number of received UDP datagrams for which there was no application at the destination port.

**udpInErrors**

OID 1.3.6.1.2.1.7.3

Description The number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port.

**udpOutDatagrams**

OID 1.3.6.1.2.1.7.4

Description The total number of UDP datagrams sent from this entity.

**UDP Listener Table**

The UDP listener table contains information about this entity's UDP end-points on which a local application is currently accepting datagrams.

**udpTable**

OID 1.3.6.1.2.1.7.5

Description A table containing UDP listener information.

**udpEntry**

OID 1.3.6.1.2.1.7.5.1

Description Information about a particular current UDP listener.

Index udpLocalAddress, udpLocalPort

**udpLocalAddress**

OID 1.3.6.1.2.1.7.5.1.1

Description The local IP address for this UDP listener. In the case of a UDP listener that is willing to accept datagrams for any IP interface associated with the node, the value 0.0.0.0 is used.

**udpLocalPort**

OID 1.3.6.1.2.1.7.5.1.2

Description The local port number for this UDP listener.

**EGP Group**

Implementation of the EGP group is mandatory for all systems that implement the EGP.

---

**Note:** HP does not support the EGP Group. This section is not applicable. Refer to the RFC1213 for complete information regarding the EGP Group.

---

## Transmission Group

Based on the transmission media underlying each interface on a system, the corresponding portion of the Transmission group is mandatory for that system.

When Internet-standard definitions for managing transmission media are defined, the transmission group is used to provide a prefix for the names of those objects.

Typically, such definitions reside in the experimental portion of the MIB until they are proven; then, as a part of the Internet standardization process, the definitions are accordingly elevated and a new object identifier under the transmission group is defined. By convention, the name assigned is

```
type Object Identifier ::= { transmission number }
```

where *type* is the symbolic value used for the media in the ifType column of the ifTable object, and *transmission number* is the actual integer value corresponding to the symbol.

## SNMP Group

Implementation of the SNMP group is mandatory for all systems that support an SNMP protocol entity. Some of the objects defined next are zero-valued in those SNMP implementations that are optimized to support only those functions specific to either a management agent or a management station. All of the objects that follow refer to an SNMP entity, and there might be several SNMP entities residing on a managed node (for example, if the node is acting as a management station).

### snmplnPks

OID 1.3.6.1.2.1.11.1

Description The total number of messages delivered to the SNMP entity from the transport service.

### snmpOutPkts

OID 1.3.6.1.2.1.11.2

Description The total number of SNMP messages that were passed from the SNMP protocol entity to the transport service.

### snmplnBadVersions

OID 1.3.6.1.2.1.11.3

Description The total number of SNMP messages that were delivered to the SNMP protocol entity and were for an unsupported SNMP version.

### snmplnBadCommunityNames

OID 1.3.6.1.2.1.11.4

Description The total number of SNMP messages delivered to the SNMP protocol entity that used an SNMP community name not known to said entity.

### snmplnBadCommunityUses

OID 1.3.6.1.2.1.11.5

Description     The total number of SNMP messages delivered to the SNMP protocol entity that represented an SNMP operation that was not allowed by the SNMP community named in the message.

**snmplnASNParseErrs**

OID                1.3.6.1.2.1.11.6

Description     The total number of ASN.1 or BER errors encountered by the SNMP protocol entity when decoding received SNMP messages.

---

**Note:** 1.3.6.1.2.1.11.7 is not used.

---

**snmplnTooBig**

OID                1.3.6.1.2.1.11.8

Description     The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is tooBig.

**snmplnNoSuchNames**

OID                1.3.6.1.2.1.11.9

Description     The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is noSuchName.

**snmplnBadValues**

OID                1.3.6.1.2.1.11.10

Description     The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is badValue.

**snmplnReadOnlys**

OID                1.3.6.1.2.1.11.11

Description     The total number of valid SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is readOnly.

Note              It is a protocol error to generate an SNMP PDU that contains the value readOnly in the error-status field; as such, this object is provided as a means of detecting incorrect implementations of the SNMP.

**snmplnGenErrs**

OID                1.3.6.1.2.1.11.12

Description     The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is genErr.

**snmplnTotalReqVars**

OID                1.3.6.1.2.1.11.13

Description The total number of MIB objects that have been retrieved successfully by the SNMP protocol entity as the result of receiving valid SNMP Get-Request and Get-Next PDUs.

#### **snmpInTotalSetVars**

OID 1.3.6.1.2.1.11.14

Description The total number of MIB objects that have been altered successfully by the SNMP protocol entity as the result of receiving valid SNMP Set-Request PDUs.

#### **snmpInGetRequests**

OID 1.3.6.1.2.1.11.15

Status Mandatory

Description The total number of SNMP Get-Request PDUs that have been accepted and processed by the SNMP protocol entity.

#### **snmpInGetNexts**

OID 1.3.6.1.2.1.11.16

Description The total number of SNMP Get-Next PDUs that have been accepted and processed by the SNMP protocol entity.

#### **snmpInSetRequests**

OID 1.3.6.1.2.1.11.17

Description The total number of SNMP Set-Request PDUs that have been accepted and processed by the SNMP protocol entity.

#### **snmpInGetResponses**

OID 1.3.6.1.2.1.11.18

Description The total number of SNMP Get-Response PDUs that have been accepted and processed by the SNMP protocol entity.

#### **snmpInTraps**

OID 1.3.6.1.2.1.11.19

Description The total number of SNMP Trap PDUs that have been accepted and processed by the SNMP protocol entity.

#### **snmpOutTooBig**

OID 1.3.6.1.2.1.11.20

Description The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status field is too large.

#### **snmpOutNoSuchNames**

OID 1.3.6.1.2.1.11.21

Description     The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status field is noSuchName.

**snmpOutBadValues**

OID                1.3.6.1.2.1.11.22

Description     The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status field is badValue.

---

**Note:** 1.3.6.1.2.1.11.23 is not used.

---

**snmpOutGenErrs**

OID                1.3.6.1.2.1.11.24

Description     The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status field is genErr.

**snmpOutGetRequests**

OID                1.3.6.1.2.1.11.25

Description     The total number of SNMP Get-Request PDUs that have been generated by the SNMP protocol entity.

**snmpOutGetNexts**

OID                1.3.6.1.2.1.11.26

Description     The total number of SNMP Get-Next PDUs that have been generated by the SNMP protocol entity.

**snmpOutSetRequests**

OID                1.3.6.1.2.1.11.27

Description     The total number of SNMP Set-Request PDUs that have been generated by the SNMP protocol entity.

**snmpOutGetResponses**

OID                1.3.6.1.2.1.11.28

Description     The total number of SNMP Get-Response PDUs that have been generated by the SNMP protocol entity.

**snmpOutTraps**

OID                1.3.6.1.2.1.11.29

Description     The total number of SNMP Trap PDUs that have been generated by the SNMP protocol entity.

**snmpEnableAuthenTraps**

OID 1.3.6.1.2.1.11.30

Description Indicates whether the SNMP agent process is permitted to generate authentication-failure traps. The value of this object overrides any configuration information; as such, it provides a means whereby all authentication-failure traps might be disabled. Possible values are enabled (1) or disabled (2).

Note This object is stored in nonvolatile memory so that it remains constant between reinitializations of the switch. This value can be changed with the `agtCfgSet` Telnet command.





# FE MIB Objects

## 3

This chapter provides descriptions and other information specific to FE MIB object types and includes the following major topics:

- [Overview](#), page 74
- [FIBRE-CHANNEL-FE-MIB \(MIB-II branch\)](#), page 74
- [FCFABRIC-ELEMENT-MIB \(Experimental Branch\)](#), page 96

## Overview

HP supports two versions of the FE MIB:

- **FIBRE-CHANNEL-FE-MIB (RFC2837)** in the **MIB-II** branch.
- **FCFABRIC-ELEMENT-MIB** in the **experimental** branch.

The version of the FE MIB supported depends on the version of the Fabric OS. [Table 5](#) lists which FE MIB is supported by Fabric OS version.

**Table 5: FE MIBs and Supported Fabric OS Versions**

| MIB  | 4.1.x | 4.0.x | 3.1.x | 3.0.x | 2.6.x |
|--|-------|-------|-------|-------|-------|
| FIBRE-CHANNEL-FE-MIB (MIB-II branch)       | Yes   | Yes   | Yes   | Yes   | No    |
| FCFABRIC-ELEMENT-MIB (experimental branch) | No    | No    | No    | Yes   | Yes   |

## FIBRE-CHANNEL-FE-MIB (MIB-II branch)

This section contains descriptions and other information specific to FIBRE-CHANNEL-FE-MIB (in the MIB-II branch), including:

- [FIBRE-CHANNEL-FE-MIB Organization](#), page 75
- [Definitions for FIBRE-CHANNEL-FE-MIB](#), page 77
- [Configuration Group](#), page 80
- [Status Group](#), page 84
- [Error Group](#), page 88
- [Accounting Group](#), page 90
- [Capability Group](#), page 94

The descriptions of each of the MIB variables in this chapter come directly from the FIBRE-CHANNEL-FE-MIB itself.

---

**Note:** HP does not support the settable Write function for any of the FIBRE-CHANNEL-FE-MIB objects except `fcFxpPortPhyAdminStatus`. E\_Port information is not provided in the FIBRE-CHANNEL-FE-MIB.

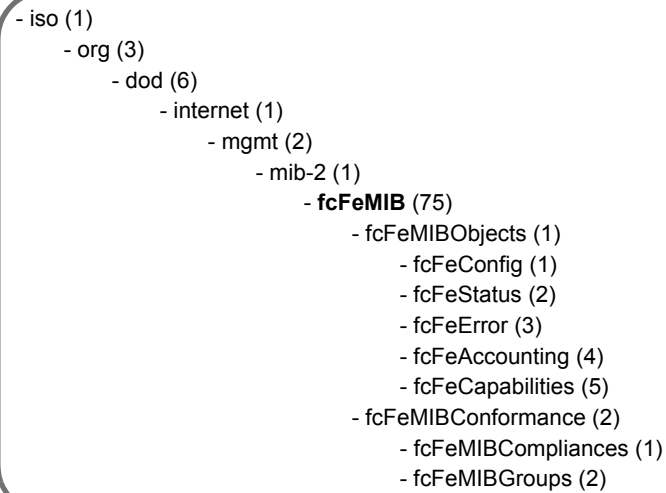
---

The object types in FIBRE-CHANNEL-FE-MIB are organized into the following groupings:

- Configuration
- Operational
- Error
- Accounting
- Capability

## FIBRE-CHANNEL-FE-MIB Organization

Figure 11, Figure 12, and Figure 13 show the organization and structure of FIBRE-CHANNEL-FE-MIB.



```
graph TD; iso["iso (1)"] --> org["org (3)"]; org --> dod["dod (6)"]; dod --> internet["internet (1)"]; internet --> mgmt["mgmt (2)"]; mgmt --> mib2["mib-2 (1)"]; mib2 --> fcFeMIB["fcFeMIB (75)"]; fcFeMIB --> fcFeMIBObjects["fcFeMIBObjects (1)"]; fcFeMIB --> fcFeConfig["fcFeConfig (1)"]; fcFeMIB --> fcFeStatus["fcFeStatus (2)"]; fcFeMIB --> fcFeError["fcFeError (3)"]; fcFeMIB --> fcFeAccounting["fcFeAccounting (4)"]; fcFeMIB --> fcFeCapabilities["fcFeCapabilities (5)"]; fcFeMIB --> fcFeMIBConformance["fcFeMIBConformance (2)"]; fcFeMIB --> fcFeMIBCompliances["fcFeMIBCompliances (1)"]; fcFeMIB --> fcFeMIBGroups["fcFeMIBGroups (2)"];
```

- iso (1)
  - org (3)
    - dod (6)
      - internet (1)
        - mgmt (2)
          - mib-2 (1)
            - **fcFeMIB** (75)
              - fcFeMIBObjects (1)
              - fcFeConfig (1)
              - fcFeStatus (2)
              - fcFeError (3)
              - fcFeAccounting (4)
              - fcFeCapabilities (5)
              - fcFeMIBConformance (2)
              - fcFeMIBCompliances (1)
              - fcFeMIBGroups (2)

Figure 11: FIBRE-CHANNEL-FE-MIB Overall Tree Structure

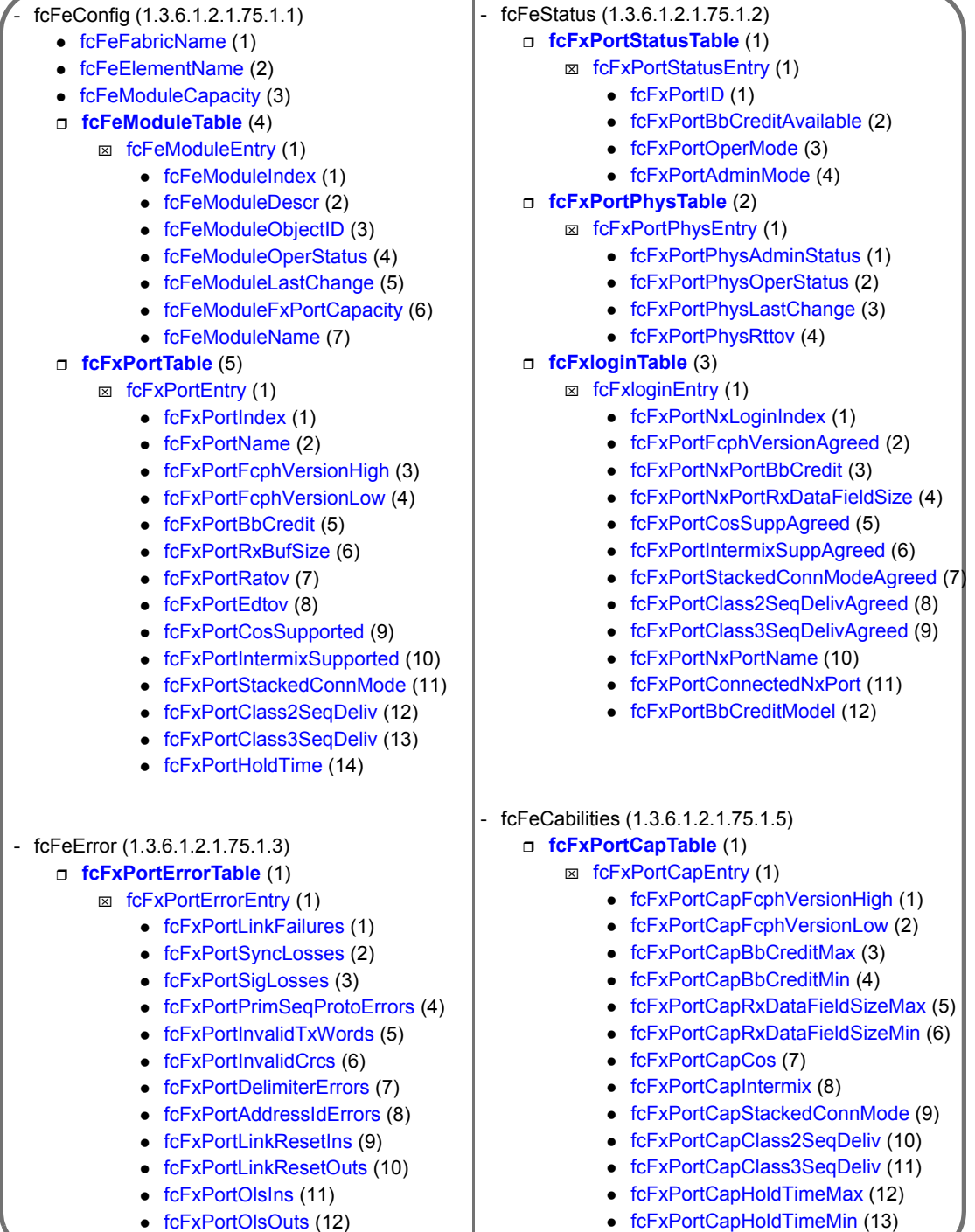


Figure 12: Tree Structure for fcFeConfig, fcFeStatus, fcFeError, and fcFeCapabilities Tables

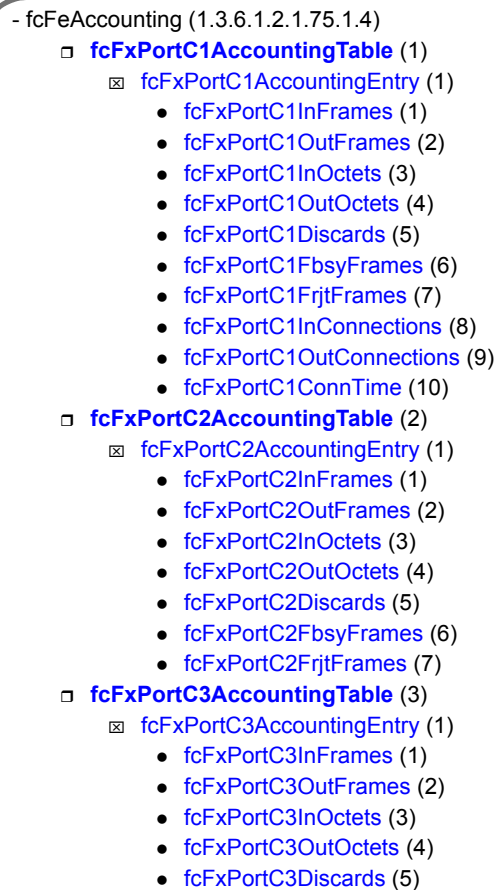


Figure 13: Tree Structure for fcFeAccounting Tables

## Definitions for FIBRE-CHANNEL-FE-MIB

The definitions in [Table 6](#) are used for FIBRE-CHANNEL-FE-MIB.

Table 6: FIBRE-CHANNEL-FE-MIB Definitions

| Type Definition | Value                         | Description |
|-----------------|-------------------------------|-------------|
| Display string  | Octet string of size 0 to 255 |             |
| Milliseconds    | Integer from 0 to 2147383647  |             |
| Microseconds    | Integer from 0 to 2147383647  |             |

**Table 6: FIBRE-CHANNEL-FE-MIB Definitions (Continued)**

| Type Definition   | Value                                | Description  |
|-------------------|--------------------------------------|--|
| FcNameId          | Octet string of size 8               | World Wide Name or Fibre Channel name associated with an FC entity. It is a Network_Destination_ID or Network_Source_ID composed of a value up to 60 bits wide, occupying the remaining 8 bytes while the first four bits identifies the format of the Name_Identifier.<br>Name_Identifier hex values:<br>0 (ignored)<br>1 (IEEE 48-bit address)<br>2 (IEEE extended)<br>3 (locally assigned)<br>4 (32-bit IP address) |
| FabricName        | Octet string of size 8               | The name identifier of a fabric. Each fabric provides a unique fabric name.<br>Valid formats include:<br>IEEE 48<br>Local  |
| FcPortName        | Octet string of size 8               | The name identifier associated with a port.<br>Valid formats include:<br>IEEE 48<br>IEEE extended<br>Local   |
| FcAddressId       | Octet string of size 3               | A 24-bit value unique within the address space of a fabric.  |
| FcRxDataFieldSize | Integer from 128 to 2112             | Receive data field size of an Nx_Port or Fx_Port.  |
| FcBbCredit        | Integer from 0 to 32767              | Buffer-to-buffer credit of an Nx_Port or Fx_Port.  |
| FcphVersion       | Integer from 0 to 255                | Version of FC-PH supported by an Nx_Port or Fx_Port.   |
| FcStackedConnMode | Integer from 1 to 3                  | Indicates the Class 1 Stacked Connect Mode supported by an Nx_Port or Fx_Port.<br>1 (none)<br>2 (transparent)<br>3 (lockedDown)  |
| FcCosCap          | Integer from 1 to 127                | Class of service capability of an Nx_Port or Fx_Port.<br>bit 0 (Class F)<br>bit 1 (Class 1)<br>bit 2 (Class 2)<br>bit 3 (Class 3)<br>bit 4 (Class 4)<br>bit 5 (Class 5)<br>bit 6 (Class 6)<br>bit 7 (reserved for future)  |
| FcOBaudRate       | Integer according to FC-0 baud rates | 1 (other) None of below<br>2 (one-eighth) 155 Mbaud (12.5 MB/s)<br>4 (quarter) 266 Mbaud (25.0 MB/s)<br>8 (half) 532 Mbaud (50.0 MB/s)<br>16 (full) 1 Gbaud (100 MB/s)<br>32 (double) 2 Gbaud (200 MB/s)<br>64 (quadruple) 4 Gbaud (400 MB/s)  |

**Table 6: FIBRE-CHANNEL-FE-MIB Definitions (Continued)**

| Type Definition    | Value                   | Description   |
|--------------------|-------------------------|---|
| FcOBaudRateCap     | Integer from 0 to 127   | bit 0 (other)<br>bit 1 (one-eighth)<br>bit 2 (quarter)<br>bit 3 (half)<br>bit 4 (full)<br>bit 5 (double)<br>bit 6 (quadruple)<br>bit 7 (Reserved for future)  |
| FcOMediaCap        | Integer from 0 to 65535 | bit 0 (unknown)<br>bit 1 (single mode fiber (sm))<br>bit 2 (multimode fiber 50 micron (m5))<br>bit 3 (multimode fiber 62.5 micron (m6))<br>bit 4 (video cable (tv))<br>bit 5 (miniature cable (mi))<br>bit 6 (shielded twisted pair (stp))<br>bit 7 (twisted wire (tw))<br>bit 8 (long video (lv))<br>bits 9-15 (Reserved for future use) |
| FcOMedium          | Integer                 | 1 (unknown)<br>2 (sm)<br>4 (m5)<br>8 (m6)<br>16 (tv)<br>32 (mi)<br>64 (stp)<br>128 (tw)<br>256 (lv)   |
| FcOTxType          | Integer                 | 1 (unknown)<br>2 (longWaveLaser (LL))<br>3 (shortWaveLaser (SL))<br>4 (longWaveLED (LE))<br>5 (electrical (EL))<br>6 (shortWaveLaser-noOFC (SN))  |
| FcODistance        | Integer                 | The FC-0 distance range associated with a port transmitter:<br>1 (unknown)<br>2 (long)<br>3 (intermediate)<br>4 (short)   |
| FcFeModuleCapacity | Integer from 1 to 256   | Maximum number of modules within a fabric element; returns 1 for all devices.   |
| FcFeFxPortCapacity | Integer from 1 to 256   | Maximum number of Fx_Ports within a module.   |
| FcFeModuleIndex    | Integer from 1 to 256   | Module index within a conceptual table.   |
| FcFeFxPortIndex    | Integer from 1 to 256   | Fx_Port index within a conceptual table.  |
| FcFeNxPortIndex    | Integer from 1 to 256   | Nx_Port index within a conceptual table.  |
| FcFxPortMode       | Integer                 | 1 (unknown)<br>2 (F_Port)<br>3 (FL_Port)  |
| FcBbCreditModel    | Integer                 | BB_Credit model of an Fx_Port.<br>1 (regular)<br>2 (alternate)  |

## Configuration Group

This group consists of scalar objects and tables. It contains the configuration and service parameters of the fabric element and the Fx\_Ports.

The group represents a set of parameters associated with the fabric element or an Fx\_Port to support its Nx\_Ports.

### **fcFeFabricName**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.1.1  |
| Description | The Name_Identifier of the fabric to which this fabric element belongs. |
| Note        | Returns the WWN of the primary switch in the fabric.                    |

### **fcFeElementName**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.1.2                       |
| Description | The Name_Identifier of the fabric element. |
| Note        | Returns the WWN of the switch.             |

### **fcFeModuleCapacity**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.1.3  |
| Description | The maximum number of modules in the fabric element, regardless of their current state. |
| Note        | The valid value for the Core Switch 2/64 and SAN Director 2/128 is 1 .                  |

## **fc Fabric Element Module Table**

This table contains one entry for each module and information about the modules.

### **fcFeModuleTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.1.4  |
| Description | A table that contains information about the modules, one entry for each module in the fabric element. |

### **fcFeModuleEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.1.4.1  |
| Description | An entry containing the configuration parameters of a module. |
| Index       | fcFeModuleIndex   |

### **fcFeModuleIndex**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.1.4.1.1  |
| Description | Identifies the module within the fabric element for which this entry contains information. This value is never greater than fcFeModuleCapacity. |



**fcFeModuleDescr**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.1.4.1.2   |
| Description | A textual description of the module. This value should include the full name and version identification of the module. It should contain printable ASCII characters. |
| Note        | See “ <a href="#">sysDescr</a> ” on page 44.   |

**fcFeModuleObjectID**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.1.4.1.3  |
| Description | <p>The vendor’s authoritative identification of the module. This value might be allocated within the SMI enterprises subtree (1.3.6.1.4.1) and provides a straightforward and unambiguous means for determining what kind of module is being managed.</p> <p>For example, this object could take the value 1.3.6.1.4.1.99649.3.9 if vendor Neufe Inc. was assigned the subtree 1.3.6.1.4.1.99649 and had assigned the identifier 1.3.6.1.4.1.99649.3.9 to its FeFiFo-16 PlugInCard.</p> |
| Note        | See “ <a href="#">sysObjectID</a> ” on page 44.   |

**fcFeModuleOperStatus**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.1.4.1.4   |
| Description | <p>Indicates the operational status of the module:</p> <ul style="list-style-type: none"> <li>— online (1) The module is functioning properly.</li> <li>— offline (2) The module is not available.</li> <li>— testing (3) The module is under testing.</li> <li>— faulty (4) The module is defective in some way.</li> </ul> |

**fcFeModuleLastChange**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.1.4.1.5   |
| Description | Contains the value of sysUpTime when the module entered its current operational status. A value of 0 indicates that the operational status of the module has not changed since the agent last restarted. |

**fcFeModuleFxPortCapacity**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.1.4.1.6   |
| Description | The number of Fx_Ports that can be contained within the module. Within each module, the ports are uniquely numbered in the range 1 to fcFeModuleFxPortCapacity, inclusive. However, the numbers are not required to be contiguous. |
| Note        | The valid value for Core Switch 2/64 and SAN Director 2/128 is 64.   |

**fcFeModuleName**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.1.4.1.7                   |
| Description | The Name_Identifier of the module.         |
| Note        | The return value is the WWN of the switch. |

**Fx\_Port Table**

This table contains the port configuration parameters, one entry for each Fx\_Port.

**fcFxPortTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.1.5  |
| Description | A table that contains configuration and service parameters of the Fx_Ports, one entry for each Fx_Port in the fabric element. |

**fcFxPortEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.1.5.1  |
| Description | An entry containing the configuration and service parameters of an Fx_Port. |
| Index       | fcFeModuleIndex<br>fcFxPortIndex  |

**fcFxPortIndex**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.1.5.1.1   |
| Description | Identifies the Fx_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx_Port until the module is reinitialized. |

**fcFxPortName**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.1.5.1.2   |
| Description | The World Wide Name of this Fx_Port. Each Fx_Port has a unique port World Wide Name within the fabric. |
| Note        | The return value is the WWN of the port.   |

**Fx\_Port Common Service Parameters****fcFxPortFcphVersionHigh**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.1.5.1.3   |
| Description | The highest or most recent version of FC-PH that the Fx_Port is configured to support. |

**fcFxPortFcphVersionLow**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.1.5.1.4   |
| Description | The lowest or earliest version of FC-PH that the Fx_Port is configured to support. |

**fcFxPortBbCredit**

OID 1.3.6.1.2.1.75.1.1.5.1.5

Description The total number of receive buffers available for holding Class 1 connect-request, and Class 2 or 3 frames from the attached Nx\_Port. It is for buffer-to-buffer flow control in the direction from the attached Nx\_Port (if applicable) to Fx\_Port.

**fcFxPortRxBufSize**

OID 1.3.6.1.2.1.75.1.1.5.1.6

Description The largest Data\_Field Size (in octets) for an FT\_1 frame that can be received by the Fx\_Port.

**fcFxPortRatov**

OID 1.3.6.1.2.1.75.1.1.5.1.7

Description The Resource\_Allocation\_Timeout value configured for the Fx\_Port. This is used as the time-out value for determining when to reuse an Nx\_Port resource, such as a Recovery\_Qualifier. It represents E\_D\_TOV (see next object) plus twice the maximum time that a frame might be delayed within the fabric and still be delivered.

**fcFxPortEditov**

OID 1.3.6.1.2.1.75.1.1.5.1.8

Description The E\_D\_TOV value configured for the Fx\_Port. The Error\_Detect\_Timeout value is used as the time-out value for detecting an error condition.

**Fx\_Port Class Service Parameters****fcFxPortCosSupported**

OID 1.3.6.1.2.1.75.1.1.5.1.9

Description A value indicating the set of Classes of Service supported by the Fx\_Port.

**fcFxPortIntermixSupported**

OID 1.3.6.1.2.1.75.1.1.5.1.10

Description A flag indicating whether the Fx\_Port supports an Intermixed Dedicated Connection.

**fcFxPortStackedConnMode**

OID 1.3.6.1.2.1.75.1.1.5.1.11

Description A value indicating the mode of Stacked Connect supported by the Fx\_Port.

**fcFxPortClass2SeqDeliv**

OID 1.3.6.1.2.1.75.1.1.5.1.12

Description A flag indicating whether Class 2 Sequential Delivery is supported by the Fx\_Port.

**fcFxpPortClass3SeqDeliv**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.1.5.1.13  |
| Description | A flag indicating whether Class 3 Sequential Delivery is supported by the Fx_Port. |

**Other Fx\_Port Parameters****fcFxpPortHoldTime**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.1.5.1.14   |
| Description | The maximum time (in microseconds) that the Fx_Port holds a frame before discarding the frame if it is unable to deliver the frame. The value 0 means that the Fx_Port does not support this parameter. |

**Status Group**

This group consists of tables that contain operational status and established service parameters for the fabric element and the attached Nx\_Ports.

**Fx\_Port Status Table**

This table contains the operational status and parameters of the Fx\_Ports, one entry for each Fx\_Port.

**fcFxpPortStatusTable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.2.1   |
| Description | A table that contains operational status and parameters of the Fx_Ports, one entry for each Fx_Port in the fabric element. |

**fcFxpPortStatusEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.2.1.1   |
| Description | An entry containing operational status and parameters of an Fx_Port. |
| Index       | fcFeModuleIndex<br>fcFxpPortIndex                                    |

**fcFxpPortID**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.2.1.1.1  |
| Description | The address identifier by which this Fx_Port is identified within the fabric. The Fx_Port might assign its address identifier to its attached Nx_Ports during fabric login. |

**fcFxpPortBbCreditAvailable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.2.1.1.2   |
| Description | The number of buffers currently available for receiving frames from the attached port in the buffer-to-buffer flow control. The value should be less than or equal to fcFxpPortBbCredit. |

**fcFxPortOperMode**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.2.1.1.3   |
| Description | The current operational mode of the Fx_Port:<br>— unknown (1)<br>— fPort (2)<br>— flPort (3) |

**fcFxPortAdminMode**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.2.1.1.4                     |
| Description | The desired operational mode of the Fx_Port. |

**Fx\_Port Physical Level Table**

This table contains the physical level status and parameters of the Fx\_Ports, one entry for each Fx\_Port in the fabric element.

**fcFxPortPhysTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.2.2  |
| Description | A table that contains the physical level status and parameters of the Fx_Ports, one entry for each Fx_Port in the fabric element. |

**fcFxPortPhysEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.2.2.1  |
| Description | An entry containing physical level status and parameters of an Fx_Port. |
| Index       | fcFeModuleIndex<br>fcFxPortIndex  |

**fcFxPortPhysAdminStatus**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.2.2.1.1  |
| Description | The desired state of the Fx_Port. A management station might place the Fx_Port in a desired state by setting this object accordingly. Possible values are:<br>— online (1) Place port online<br>— offline (2) Take port offline<br>— testing (3) Initiate test procedures<br><br>The testing state (3) indicates that no operational frames can be passed. When a fabric element initializes, all Fx_Ports start with fcFxPortPhysAdminStatus in the offline state (2). As the result of either explicit management action or per configuration information accessible by the fabric element, fcFxPortPhysAdminStatus is then changed to either the online (1) or testing (3) states or remains in the offline state (2). |

**fcFxPortPhysOperStatus**

OID 1.3.6.1.2.1.75.1.2.2.1.2

Description The current operational status of the Fx\_Port. Possible values are:

- online (1) Login might proceed.
- offline (2) Login cannot proceed.
- testing (3) Port is under test.
- linkFailure (4) Failure after online testing.

The testing state (3) indicates that no operational frames can be passed. If fcFxPortPhysAdminStatus is offline (2), then fcFxPortPhysOperStatus should be offline (2). If fcFxPortPhysAdminStatus is changed to online (1), then fcFxPortPhysOperStatus should change to online (1) if the Fx\_Port is ready to accept a fabric login request from the attached Nx\_Port; it should proceed and remain in the linkFailure (4) state only if there is a fault that prevents it from going to the online state (1).

**fcFxPortPhysLastChange**

OID 1.3.6.1.2.1.75.1.2.2.1.3

Description The value of sysUpTime at the time the Fx\_Port entered its current operational status. A value of 0 indicates that the Fx\_Port operational status has not changed since the agent last restarted.

**fcFxPortPhysRttov**

OID 1.3.6.1.2.1.75.1.2.2.1.4

Description The Receiver\_Transmitter\_Timeout value of the Fx\_Port. This is used by the receiver logic to detect loss of synchronization.

Note This object is read-only. It is listed in the MIB definition as read-write (which is incorrect).

**Fx\_Port Fabric Login Table**

This table contains one entry for each Fx\_Port in the fabric element and the service parameters that have been established from the most recent fabric login, whether implicit or explicit.

**fcFxloginTable**

OID 1.3.6.1.2.1.75.1.2.3

Description A table containing service parameters established from the most recent fabric login, explicit or implicit, with one entry for each Fx\_Port in the fabric element.

**fcFxloginEntry**

OID 1.3.6.1.2.1.75.1.2.3.1

Description An entry containing service parameters established from a successful fabric login.

Index fcFxloginModuleIndex, fcFxloginFxPortIndex,  
fcFxloginNxPortIndex

**fcFxPortNxLoginIndex**

OID 1.3.6.1.2.1.75.1.2.3.1.1

Description The associated Nx\_Port in the attachment for which the entry contains information.

**fcFxPortFcphVersionAgreed**

OID 1.3.6.1.2.1.75.1.2.3.1.2

Description The version of FC-PH that the Fx\_Port has agreed to support from the fabric login.

**fcFxPortNxPortBbCredit**

OID 1.3.6.1.2.1.75.1.2.3.1.3

Description The total number of buffers available for holding Class 1 connect-request, and Class 2 or Class 3 frames to be transmitted to the attached Nx\_Port. It is for buffer-to-buffer flow control in the direction from Fx\_Port to Nx\_Port. The buffer-to-buffer flow control mechanism is indicated in the respective fcFxPortBbCreditModel.

**fcFxPortNxPortRxDataFieldSize**

OID 1.3.6.1.2.1.75.1.2.3.1.4

Description The Receive Data Field Size of the attached Nx\_Port. This is a binary value that specifies the largest Data Field Size for an FT\_1 frame that can be received by the Nx\_Port. The value is a number of bytes in the range 128 to 2112, inclusive.

**fcFxPortCosSuppAgreed**

OID 1.3.6.1.2.1.75.1.2.3.1.5

Description Indicates that the attached Nx\_Port has requested the Fx\_Port for the support of classes of services and the Fx\_Port has granted the request.

**fcFxPortIntermixSuppAgreed**

OID 1.3.6.1.2.1.75.1.2.3.1.6

Description A variable indicating that the attached Nx\_Port has requested the Fx\_Port for Intermix support, and the Fx\_Port has granted the request. This flag is valid only if Class 1 service is supported. Possible values are:

- yes (1) The attached Nx\_Port has requested the Fx\_Port for Intermix support, and the Fx\_Port has granted the request.
- no (2) The attached Nx\_Port has not requested the Fx\_Port for Intermix support.

**fcFxPortStackedConnModeAgreed**

OID 1.3.6.1.2.1.75.1.2.3.1.7

Description Indicates whether the Fx\_Port has agreed to support stacked connect from the fabric login. This is meaningful only if Class 1 service has been agreed to.

**fcFxPortClass2SeqDelivAgreed**

OID 1.3.6.1.2.1.75.1.2.3.1.8

Description Indicates whether the Fx\_Port has agreed to support Class 2 sequential delivery from the fabric login. This is meaningful only if Class 2 service has been agreed to. Possible values are:

- yes (1) The Fx\_Port has agreed to support Class 2 sequential delivery from the fabric login.
- no (2) The Fx\_Port has not agreed to support Class 2 sequential delivery from the fabric login.

**fcFxPortClass3SeqDelivAgreed**

OID 1.3.6.1.2.1.75.1.2.3.1.9

Description A flag indicating whether the Fx\_Port has agreed to support Class 3 sequential delivery from the fabric login. This is meaningful only if Class 3 service has been agreed to. Possible values are:

- yes (1) The Fx\_Port has agreed to support Class 3 sequential delivery from the fabric login.
- no (2) The Fx\_Port has not agreed to support Class 3 sequential delivery from the fabric login.

**fcFxPortNxPortName**

OID 1.3.6.1.2.1.75.1.2.3.1.10

Description The port name of the attached Nx\_Port, if applicable. If the value of this object is '0000000000000000'H, this Fx\_Port has no Nx\_Port attached to it.

**fcFxPortConnectedNxPort**

OID 1.3.6.1.2.1.75.1.2.3.1.11

Description The address identifier of the destination Fx\_Port with which this Fx\_Port is currently engaged in either a Class 1 or loop connection. If the value of this object is '000000'H, this Fx\_Port is not engaged in a connection.

**fcFxPortBbCreditModel**

OID 1.3.6.1.2.1.75.1.2.3.1.12

Description Identifies the BB\_Credit model used by the Fx\_Port. The regular model refers to the buffer-to-buffer flow control mechanism defined in FC-PH [1] and used between the F\_Port and the N\_Port. For FL\_Ports, the alternate buffer-to-buffer flow control mechanism, as defined in FC-AL [4], is used between the FL\_Port and any attached NL\_Ports.

## Error Group

This group consists of tables that contain information about the various types of errors detected. The management station might use the information in this group to determine the quality of the link between the Fx\_Port and its attached Nx\_Port.

Implementation of this group is optional.



## Fx\_Port Error Table

This table contains counters recording numbers of errors detected since the management agent reinitialized, one entry for each Fx\_Port in the fabric element.

**Note:** The first six columnar objects after the port index correspond to the counters in the link error status block.

### fcFxPortErrorTable

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.3.1   |
| Description | A table that contains counters that record the numbers of errors detected, one entry for each Fx_Port. |

### fcFxPortErrorEntry

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.3.1.1                               |
| Description | An entry containing error counters of an Fx_Port.    |
| Index       | fcFxPortErrorModuleIndex<br>fcFxPortErrorFxPortIndex |

### fcFxPortLinkFailures

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.3.1.1.1                              |
| Description | The number of link failures detected by this Fx_Port. |

### fcFxPortSyncLosses

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.3.1.1.2  |
| Description | The number of loss of synchronization errors detected by the Fx_Port. |

### fcFxPortSigLosses

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.3.1.1.3                                     |
| Description | The number of loss of signal errors detected by the Fx_Port. |

### fcFxPortPrimSeqProtoErrors

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.3.1.1.4  |
| Description | The number of primitive sequence protocol errors detected by the Fx_Port. |

### fcFxPortInvalidTxWords

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.3.1.1.5  |
| Description | The number of invalid transmission word errors detected by the Fx_Port. |

### fcFxPortInvalidCrcs

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.3.1.1.6   |
| Description | The number of invalid cyclic redundancy checks (CRC) detected by this Fx_Port. |

**fcFxPortDelimiterErrors**

OID 1.3.6.1.2.1.75.1.3.1.1.7

Description The number of delimiter errors detected by this Fx\_Port.

**fcFxPortAddressIdErrors**

OID 1.3.6.1.2.1.75.1.3.1.1.8

Description The number of address identifier errors detected by this Fx\_Port.

**fcFxPortLinkResetIns**

OID 1.3.6.1.2.1.75.1.3.1.1.9

Description The number of Link Reset Protocol errors received by this Fx\_Port from the attached Nx\_Port.

**fcFxPortLinkResetOuts**

OID 1.3.6.1.2.1.75.1.3.1.1.10

Description The number of Link Reset Protocol errors issued by this Fx\_Port to the attached Nx\_Port.

**fcFxPortOlsIns**

OID 1.3.6.1.2.1.75.1.3.1.1.11

Description The number of Offline Sequence errors received by this Fx\_Port.

**fcFxPortOlsOuts**

OID 1.3.6.1.2.1.75.1.3.1.1.12

Description The number of Offline Sequence errors issued by this Fx\_Port.

## Accounting Group

The Accounting group is supported only in Fabric OS v4.x.

The Accounting group consists of the following tables:

- Class 1 accounting table
- Class 2 accounting table
- Class 3 accounting table

Each table contains accounting information for the Fx\_Ports in the fabric element.

### Class 1 Accounting Table

**fcFxPortC1AccountingTable**

OID 1.3.6.1.2.1.75.1.4.1

Description A table that contains Class 1 accounting information recorded since the management agent reinitialized, one entry for each Fx\_Port in the fabric element.

**fcFxPortC1AccountingEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.4.1.1   |
| Description | An entry containing Class 1 accounting information for each Fx_Port. |
| Index       | fcFeModuleIndex<br>fcFePortIndex                                     |

**fcFxPortC1InFrames**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.4.1.1.1  |
| Description | The number of Class 1 frames (other than Class 1 connect-request) received by this Fx_Port from its attached Nx_Port. |

**fcFxPortC1OutFrames**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.4.1.1.2  |
| Description | The number of Class 1 frames (other than Class 1 connect-request) delivered through this Fx_Port to its attached Nx_Port. |

**fcFxPortC1InOctets**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.4.1.1.3  |
| Description | The number of Class 1 frame octets, including the frame delimiters, received by this Fx_Port from its attached Nx_Port. |

**fcFxPortC1OutOctets**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.4.1.1.4   |
| Description | The number of Class 1 frame octets, including the frame delimiters, delivered through this Fx_Port its attached Nx_Port. |

**fcFxPortC1Discards**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.4.1.1.5                                |
| Description | The number of Class 1 frames discarded by this Fx_Port. |

**fcFxPortC1FbsyFrames**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.4.1.1.6  |
| Description | The number of F_BSY frames generated by this Fx_Port against Class 1 connect-request. |

**fcFxPortC1FrjtFrames**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.4.1.1.7  |
| Description | The number of F_RJT frames generated by this Fx_Port against Class 1 connect-request. |

**fcFxPortC1InConnections**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.4.1.1.8   |
| Description | The number of Class 1 connections successfully established in which the attached Nx_Port is the source of the connect-request. |

**fcFxPortC1OutConnections**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.4.1.1.9  |
| Description | The number of Class 1 connections successfully established in which the attached Nx_Port is the destination of the connect-request. |

**fcFxPortC1ConnTime**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.4.1.1.10   |
| Description | The cumulative time that this Fx_Port has been engaged in Class 1 connection. The time is measured beginning when a connect-request is accepted until the connection is disengaged, either by an EOFdt or Link Reset. |

**Class 2 Accounting Table****fcFxPortC2AccountingTable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.4.2   |
| Description | A table that contains Class 2 accounting information recorded since the management agent reinitialized, with one entry for each Fx_Port in the fabric element. |

**fcFxPortC2AccountingEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.4.2.1   |
| Description | An entry containing Class 2 accounting information for each Fx_Port. |
| Index       | fcFeModuleIndex<br>fcFePortIndex                                     |

**fcFxPortC2InFrames**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.4.2.1.1   |
| Description | The number of Class 2 frames received by this Fx_Port from its attached Nx_Port. |

**fcFxPortC2OutFrames**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.75.1.4.2.1.2   |
| Description | The number of Class 2 frames delivered through this Fx_Port to its attached Nx_Port. |

**fcFxPortC2InOctets**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.75.1.4.2.1.3  |
| Description | The number of Class 2 frame octets, including the frame delimiters, received by this Fx_Port from its attached Nx_Port. |

**fcFxpPortC2OutOctets**

OID 1.3.6.1.2.1.75.1.4.2.1.4

Description The number of Class 2 frame octets, including the frame delimiters, delivered through this Fx\_Port to its attached Nx\_Port.

**fcFxpPortC2Discards**

OID 1.3.6.1.2.1.75.1.4.2.1.5

Description The number of Class 2 frames discarded by this Fx\_Port.

**fcFxpPortC2FbsyFrames**

OID 1.3.6.1.2.1.75.1.4.2.1.6

Description The number of F\_BSY frames generated by this Fx\_Port against Class 2 frames.

**fcFxpPortC2FrjtFrames**

OID 1.3.6.1.2.1.75.1.4.2.1.7

Description The number of F\_RJT frames generated by this Fx\_Port against Class 2 frames.

**Class 3 Accounting Table****fcFxpPortC3AccountingTable**

OID 1.3.6.1.2.1.75.1.4.3

Description A table that contains Class 3 accounting information recorded since the management agent reinitialized, with one entry for each Fx\_Port in the fabric element.

**fcFxpPortC3AccountingEntry**

OID 1.3.6.1.2.1.75.1.4.3.1

Description An entry containing Class 3 accounting information for each Fx\_Port.

Index fcFeModuleIndex  
fcFePortIndex

**fcFxpPortC3InFrames**

OID 1.3.6.1.2.1.75.1.4.3.1.1

Description The number of Class 3 frames received by this Fx\_Port from its attached Nx\_Port.

**fcFxpPortC3OutFrames**

OID 1.3.6.1.2.1.75.1.4.3.1.2

Description The number of Class 3 frames delivered through this Fx\_Port to its attached Nx\_Port.

**fcFxPortC3InOctets**

OID 1.3.6.1.2.1.75.1.4.3.1.3

Description The number of Class 3 frame octets, including the frame delimiters, received by this Fx\_Port from its attached Nx\_Port.

**fcFxPortC3OutOctets**

OID 1.3.6.1.2.1.75.1.4.3.1.4

Description The number of Class 3 frame octets, including the frame delimiters, delivered through this Fx\_Port to its attached Nx\_Port.

**fcFxPortC3Discards**

OID 1.3.6.1.2.1.75.1.4.3.1.5

Description The number of Class 3 frames discarded by this Fx\_Port.

## Capability Group

This group consists of a table describing information about what each Fx\_Port is inherently capable of operating or supporting. A capability might be used, as expressed in its respective object value in the Configuration group. Implementation of this group is optional.

### Fx\_Port Capability Table

**fcFxPortCapTable**

OID 1.3.6.1.2.1.75.1.5.1

Description A table that contains the capabilities of the port within the fabric element, one entry for each Fx\_Port.

**fcFxPortCapEntry**

OID 1.3.6.1.2.1.75.1.5.1.1

Description An entry containing the capabilities of an Fx\_Port.

Index fcFxPortCapModuleIndex  
fcFxPortCapFxPortIndex

**fcFxPortCapFcphVersionHigh**

OID 1.3.6.1.2.1.75.1.5.1.1.1

Description The highest or most recent version of FC-PH that the Fx\_Port is capable of supporting.

**fcFxPortCapFcphVersionLow**

OID 1.3.6.1.2.1.75.1.5.1.1.2

Description The lowest or earliest version of FC-PH that the Fx\_Port is capable of supporting.

**fcFxPortCapBbCreditMax**

OID 1.3.6.1.2.1.75.1.5.1.1.3

Description The maximum number of receive buffers available for holding Class 1 connect-request, and Class 2 or Class 3 frames from the attached Nx\_Port.

**fcFxPortCapBbCreditMin**

OID 1.3.6.1.2.1.75.1.5.1.1.4

Description The minimum number of receive buffers available for holding Class 1 connect-request, and Class 2 or Class 3 frames from the attached Nx\_Port.

**fcFxPortCapRxDataFieldSizeMax**

OID 1.3.6.1.2.1.75.1.5.1.1.5

Description The maximum size (in bytes) of the data field in a frame that the Fx\_Port is capable of receiving from its attached Nx\_Port.

**fcFxPortCapRxDataFieldSizeMin**

OID 1.3.6.1.2.1.75.1.5.1.1.6

Description The minimum size (in bytes) of the data field in a frame that the Fx\_Port is capable of receiving from its attached Nx\_Port.

**fcFxPortCapCos**

OID 1.3.6.1.2.1.75.1.5.1.1.7

Description A value indicating the set of Classes of Service that the Fx\_Port is capable of supporting.

**fcFxPortCapIntermix**

OID 1.3.6.1.2.1.75.1.5.1.1.8

Description A flag indicating whether the Fx\_Port is capable of supporting the intermixing of Class 2 and Class 3 frames during a Class 1 connection. This flag is valid only if the port is capable of supporting Class 1 service. Possible values are yes (1) and no (2).

**fcFxPortCapStackedConnMode**

OID 1.3.6.1.2.1.75.1.5.1.1.9

Description A value indicating the mode of Stacked Connect requests that the Fx\_Port is capable of supporting.

**fcFxPortCapClass2SeqDeliv**

OID 1.3.6.1.2.1.75.1.5.1.1.10

Description A flag indicating whether the Fx\_Port is capable of supporting Class 2 Sequential Delivery. Possible values are yes (1) and no (2).

**fcFxPortCapClass3SeqDeliv**

OID 1.3.6.1.2.1.75.1.5.1.1.11

Description A flag indicating whether the Fx\_Port is capable of supporting Class 3 Sequential Delivery. Possible values are yes (1) and no (2).

**fcFxPortCapHoldTimeMax**

OID 1.3.6.1.2.1.75.1.5.1.1.12

Description The maximum holding time (in microseconds) that the Fx\_Port is capable of supporting.

**fcFxPortCapHoldTimeMin**

OID 1.3.6.1.2.1.75.1.5.1.1.13

Description The minimum holding time (in microseconds) that the Fx\_Port is capable of supporting.

## FCFABRIC-ELEMENT-MIB (Experimental Branch)

---

**Note:** The FCFABRIC-ELEMENT-MIB is supported only in Fabric OS v2.6.x and v3.0.x.

---

This section contains descriptions and other information that is specific to FCFABRIC-ELEMENT-MIB (in the experimental branch), including the following:

- [Overview](#), page 96
- [FCFABRIC-ELEMENT-MIB Organization](#), page 98
- [Definitions for FCFABRIC-ELEMENT-MIB](#), page 100
- [Configuration Group](#), page 102
- [Operation Group](#), page 107
- [Error Group](#), page 113
- [Accounting Group](#), page 115
- [Capability Group](#), page 115

## Overview

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**Note:** HP does not support the settable Write function for any of the Fibre Channel FE MIB objects except "[fcFxPortPhysAdminStatus](#)" on page 85.

---

The descriptions of each of the MIB variables in this chapter come directly from the FCFABRIC-ELEMENT-MIB itself.

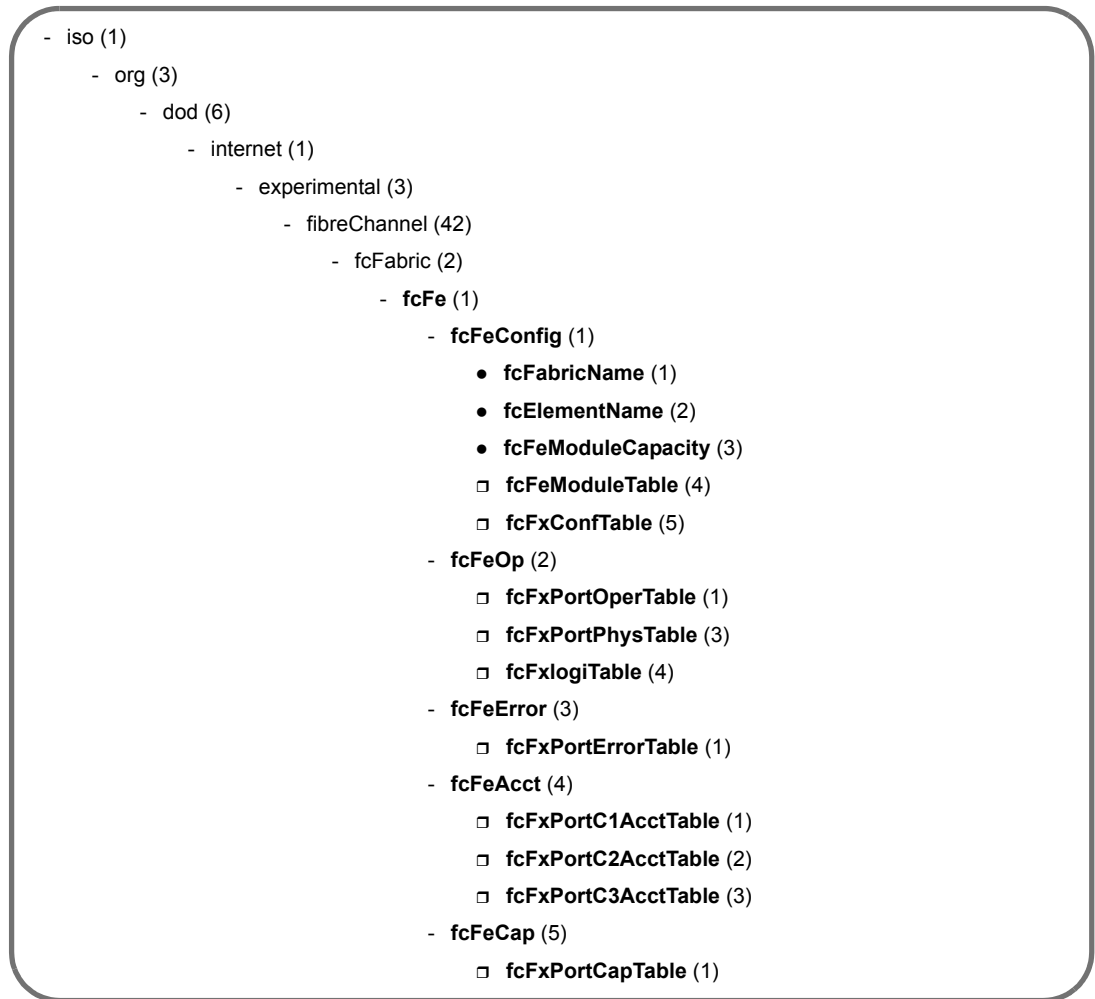


The object types in FCFABRIC-ELEMENT-MIB are organized into the following groups:

- Configuration
- Operational
- Error
- Accounting (not supported or listed)
- Capability

## FCFABRIC-ELEMENT-MIB Organization

Figure 14 through Figure 16 show the organization and structure of FCFABRIC-ELEMENT-MIB.



**Figure 14: FCFABRIC-ELEMENT-MIB Overall Tree Structure**

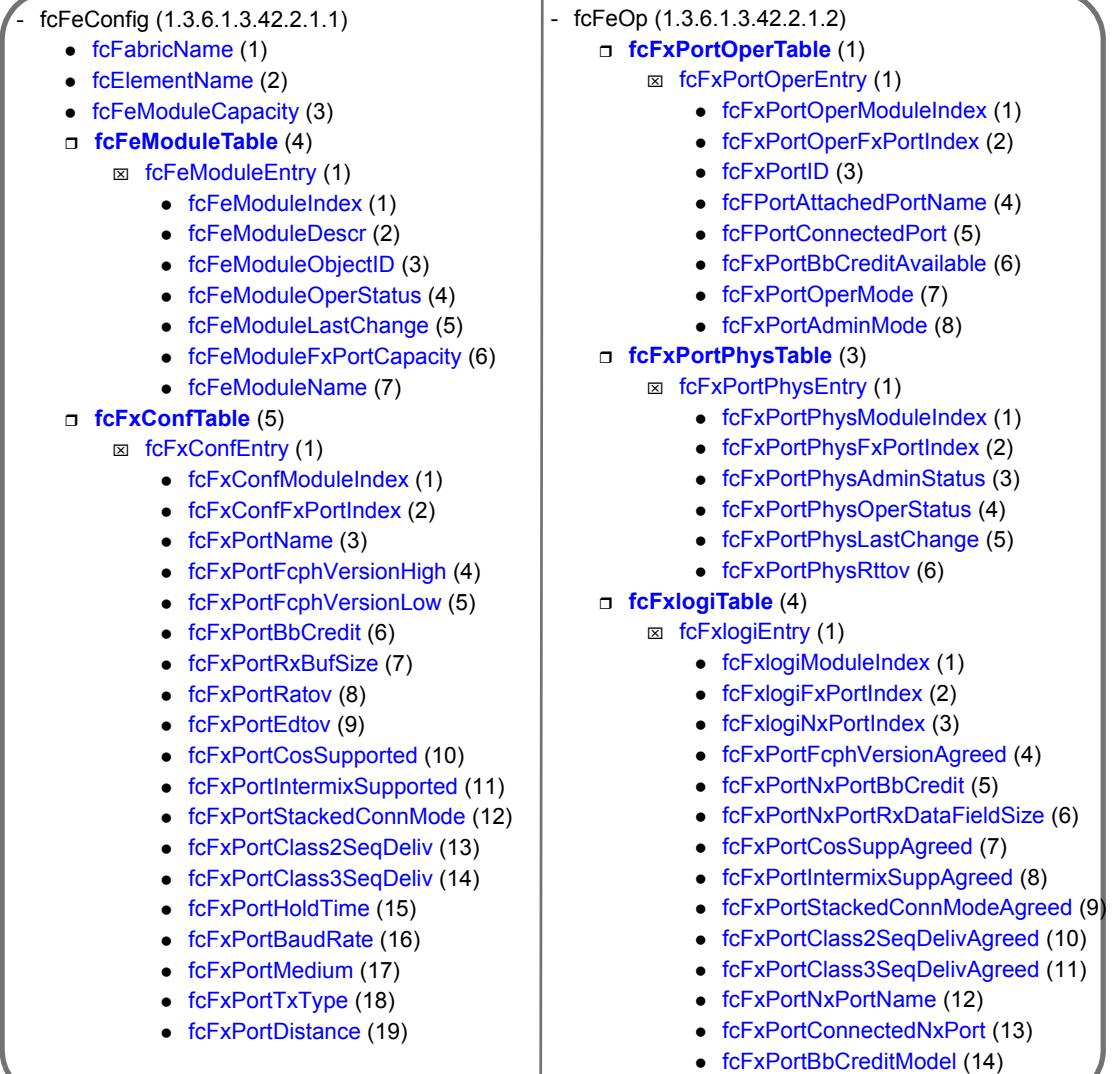


Figure 15: Tree Structure for fcFeConfig and fcFeOpTables

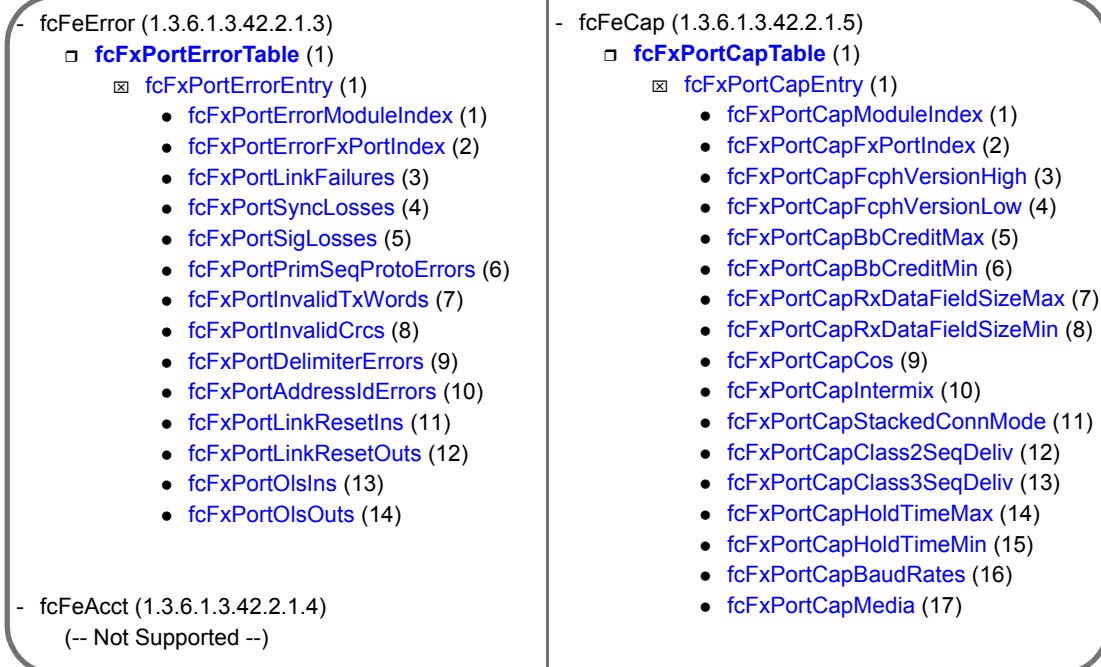


Figure 16: Tree Structure for fcFeError, fcFeAcct, and fcFeCap Tables

## Definitions for FCFABRIC-ELEMENT-MIB

The definitions in [Table 7](#) are used for FCFABRIC-ELEMENT-MIB.

Table 7: FCFABRIC-ELEMENT-MIB Definitions

| Type Definition | Value                         | Description  |
|-----------------|-------------------------------|--|
| Display string  | Octet string of size 0 to 255 |  |
| Milliseconds    | Integer from 0 to 2147383647  |  |
| Microseconds    | Integer from 0 to 2147383647  |  |
| FcNameId        | Octet string of size 8        | World Wide Name or Fibre Channel name associated with an FC entry. This is a Network_Destination_ID or Network_Source_ID composed of a value up to 60 bits wide, occupying the remaining 8 bytes while the first nibble identifies the format of the Name_Identifier.<br>Name_Identifier hex values:<br>0 (Ignored)<br>1 (IEEE 48-bit address)<br>2 (IEEE extended)<br>3 (Locally assigned)<br>4 (32-bit IP address) |

**Table 7: FCFABRIC-ELEMENT-MIB Definitions (Continued)**

| Type Definition   | Value                                | Description   |
|-------------------|--------------------------------------|---|
| FabricName        | FcNameId                             | The name identifier of a fabric. Each fabric provides a unique fabric name.<br>Only the following formats are allowed:<br>IEEE48<br>Local   |
| FcPortName        | FcNameId                             | The name identifier associated with a port.<br>Only the following formats are allowed:<br>IEEE48<br>IEEE extended<br>Local  |
| FcAddressId       | Octet string of size 3               | A 24-bit value unique within the address space of a fabric.   |
| FcRxDataFieldSize | Integer from 128 to 2112             | Receive Data_Field size.  |
| FcBbCredit        | Integer from 0 to 32767              | Buffer-to-buffer credit.  |
| FcphVersion       | Integer from 0 to 255                |   |
| FcStackedConnMode | Integer from 1 to 3                  | 1 (none)<br>2 (transparent)<br>3 (lockedDown)   |
| FcCosCap          | Integer from 1 to 127                | bit 0 (Class F)<br>bit 1 (Class 1)<br>bit 2 (Class 2)<br>bit 3 (Class 3)<br>bit 4 (Class 4)<br>bit 5 (Class 5)<br>bit 6 (Class 6)<br>bit 7 (reserved for future)  |
| FcOBaudRate       | Integer according to FC-0 baud rates | 1 (other)None of below<br>2 (one-eighth)155 Mbaud (12.5 MB/s)<br>4 (quarter)266 Mbaud (25.0 MB/s)<br>8 (half)532 Mbaud (50.0 MB/s)<br>16 (full)1 Gbaud (100 MB/s)<br>32 (double)2 Gbaud (200 MB/s)<br>64 (quadruple)4 Gbaud (400 MB/s)  |
| FcOBaudRateCap    | Integer from 0 to 127                | bit 0 (other)<br>bit 1 (one-eighth)<br>bit 2 (quarter)<br>bit 3 (half)<br>bit 4 (full)<br>bit 5 (double)<br>bit 6 (quadruple)<br>bit 7 (reserved for future)  |
| FcOMediaCap       | Integer from 0 to 65535              | bit 0 (unknown)<br>bit 1 (single mode fiber (sm))<br>bit 2 (multimode fiber 50 micron (m5))<br>bit 3 (multimode fiber 62.5 micron (m6))<br>bit 4 (video cable (tv))<br>bit 5 (miniature cable (mi))<br>bit 6 (shielded twisted pair (stp))<br>bit 7 (twisted wire (tw))<br>bit 8 (long video (lv))<br>bits 9-15 (reserved for future use) |

**Table 7: FCFABRIC-ELEMENT-MIB Definitions (Continued)**

| Type Definition    | Value                  | Description  |
|--------------------|------------------------|--|
| FcOMedium          | Integer                | 1 (unknown)<br>2 (sm)<br>4 (m5)<br>8 (m6)<br>16 (tv)<br>32 (mi)<br>64 (stp)<br>128 (tw)<br>256 (lv)  |
| FcOTxType          | Integer                | 1 (unknown)<br>2 (longWaveLaser (LL))<br>3 (shortWaveLaser (SL))<br>4 (longWaveLED (LE))<br>5 (electrical (EL))<br>6 (shortWaveLaser-noOFC (SN)) |
| FcODistance        | Integer                | The FC-0 distance range associated with a port transmitter:<br>1 (unknown)<br>2 (long)<br>3 (intermediate)<br>4 (short)                          |
| FcFeModuleCapacity | Integer range 1 to 256 |  |
| FcFeFxPortCapacity | Integer range 1 to 256 |  |
| FcFeModuleIndex    | Integer range 1 to 256 |  |
| FcFeFxPortIndex    | Integer range 1 to 256 |  |
| FcFeNxPortIndex    | Integer range 1 to 256 |  |
| FcFxPortMode       | Integer                | 1 (unknown)<br>2 (fPort)<br>3 (flPort)   |
| FcBbCreditModel    | Integer                | 1 (regular)<br>2 (alternate)   |

## Configuration Group

This group consists of scalar objects and tables. It contains the configuration and service parameters of the fabric element and the Fx\_Ports.

The group represents a set of parameters associated with the fabric element or an Fx\_Port to support its Nx\_Ports.

Implementation of this group is mandatory.

### fcFabricName

OID 1.3.6.1.3.42.2.1.1.1

Description The Name\_Identifier of the fabric to which this fabric element belongs.

Note Returns the WWN of the primary switch in the fabric.

**fcElementName**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.2                       |
| Description | The Name_Identifier of the fabric element. |
| Note        | Returns the WWN of the switch.             |

**fcFeModuleCapacity**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.3  |
| Description | The maximum number of modules in the fabric element, regardless of their current state. |
| Note        | The Core Switch 2/64 and SAN Director 2/128 do not support this MIB variable.           |

**fc Fabric Element Module Table**

This table contains information about the modules.

**fcFeModuleTable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.4   |
| Description | A table that contains information about the modules, with one entry for each module in the fabric element, |

**fcFeModuleEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.4.1  |
| Status      | Mandatory   |
| Description | An entry containing the configuration parameters of a module. |
| Index       | fcFeModuleIndex   |

**fcFeModuleIndex**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.4.1.1  |
| Description | Identifies the module within the fabric element for which this entry contains information. This value is never greater than fcFeModuleCapacity. |

**fcFeModuleDescr**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.4.1.2   |
| Description | A textual description of the module. This value should include the full name and version identification of the module. It should contain printable ASCII characters. |
| Note        | See “ <a href="#">sysDescr</a> ” on page 44.   |

**fcFeModuleObjectID**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.4.1.3  |
| Description | <p>The vendor's authoritative identification of the module. This value might be allocated within the SMI enterprises subtree (1.3.6.1.4.1) and provides a straight-forward and unambiguous means for determining what kind of module is being managed.</p> <p>For example, this object could take the value 1.3.6.1.4.1.99649.3.9 if vendor Neufe Inc. was assigned the subtree 1.3.6.1.4.1.99649, and had assigned the identifier 1.3.6.1.4.1.99649.3.9 to its FeFiFo-16 PlugInCard.</p> |
| Note        | See “ <a href="#">sysObjectID</a> ” on page 44.   |

**fcFeModuleOperStatus**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.4.1.4  |
| Description | <p>Indicates the operational status of the module:</p> <ul style="list-style-type: none"><li>— online (1) The module is functioning properly.</li><li>— offline (2) The module is not available.</li><li>— testing (3) The module is under testing.</li><li>— faulty (4) The module is defective in some way.</li></ul> |

**fcFeModuleLastChange**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.4.1.5  |
| Description | Contains the value of “ <a href="#">sysUpTime</a> ” on page 44 when the module entered its current operational status. A value of 0 indicates that the operational status of the module has not changed since the agent last restarted. |

**fcFeModuleFxPortCapacity**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.4.1.6  |
| Description | The number of Fx_Ports that can be contained within the module. Within each module, the ports are uniquely numbered from 1 to the fcFeModuleFxPortCapacity, inclusive. These numbers are not required to be contiguous. |

**fcFeModuleName**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.4.1.7                   |
| Description | The Name_Identifier of the module.         |
| Note        | The return value is the WWN of the switch. |



## Fx\_Port Configuration Table

This table contains, one entry for each Fx\_Port, the configuration parameters of the ports.

### fcFxConfTable

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.5   |
| Description | A table that contains, one entry for each Fx_Port in the fabric element, configuration and service parameters of the Fx_Ports. |

### fcFxConfEntry

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.5.1  |
| Description | An entry containing the configuration and service parameters of an Fx_Port. |
| Index       | fcFxConfModuleIndex, fcFxConfFxPortIndex                                    |

### fcFxConfModuleIndex

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.1  |
| Description | Identifies the module containing the Fx_Port for which this entry contains information. |

### fcFxConfFxPortIndex

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.2   |
| Description | Identifies the Fx_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx_Port until the module is reinitialized. |

### fcFxPortName

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.3   |
| Description | The name identifier of this Fx_Port. Each Fx_Port has a unique port name within the address space of the fabric. |
| Note        | The return value is the WWN of the port.   |

### fcFxPortFcphVersionHigh

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.4   |
| Description | The highest or most recent version of FC-PH that the Fx_Port is configured to support. |

### fcFxPortFcphVersionLow

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.5   |
| Description | The lowest or earliest version of FC-PH that the Fx_Port is configured to support. |

**fcFxPortBbCredit**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.6  |
| Description | The total number of receive buffers available for holding Class 1 connect-request Class 2 or Class 3 frames from the attached Nx_Port. It is for buffer-to-buffer flow control in the direction from the attached Nx_Port (if applicable) to Fx_Port. |

**fcFxPortRxBufSize**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.7   |
| Description | The largest Data_Field Size (in octets) for an FT_1 frame that can be received by the Fx_Port. |

**fcFxPortRatov**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.8   |
| Description | The Resource_Allocation_Timeout Value configured for the Fx_Port. This is used as the time-out value for determining when to reuse an Nx_Port resource such as a Recovery_Qualifier. It represents E_D_TOV (see next object) plus twice the maximum time that a frame might be delayed within the fabric and still be delivered. |

**fcFxPortEdtov**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.9   |
| Description | The E_D_TOV value configured for the Fx_Port. The Error_Detect_Timeout Value is used as the time-out value for detecting an error condition. |

**fcFxPortCosSupported**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.10  |
| Description | A value indicating the set of Classes of Service supported by the Fx_Port. |

**fcFxPortIntermixSupported**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.11   |
| Description | A flag indicating whether the Fx_Port supports an Intermixed Dedicated Connection. Possible values are yes (1) or no (2). |

**fcFxPortStackedConnMode**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.12  |
| Description | A value indicating the mode of stacked connect supported by the Fx_Port. |

**fcFxPortClass2SeqDeliv**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.1.5.1.13   |
| Description | A flag indicating whether Class 2 sequential delivery is supported by the Fx_Port. Possible values are yes (1) or no (2). |

**fcFxPortClass3SeqDeliv**

OID 1.3.6.1.3.42.2.1.1.5.1.14

Description A flag indicating whether Class 3 sequential delivery is supported by the Fx\_Port. Possible values are yes (1) or no (2).

**fcFxPortHoldTime**

OID 1.3.6.1.3.42.2.1.1.5.1.15

Description The maximum time (in microseconds) that the Fx\_Port holds a frame before discarding the frame if it is unable to deliver the frame. The value 0 means that the Fx\_Port does not support this parameter.

**fcFxPortBaudRate**

OID 1.3.6.1.3.42.2.1.1.5.1.16

Description The FC-0 baud rate of the Fx\_Port.

Note The Core Switch 2/64 and SAN Director 2/128 switch do not support this MIB variable.

**fcFxPortMedium**

OID 1.3.6.1.3.42.2.1.1.5.1.17

Description The FC-0 medium of the Fx\_Port.

**fcFxPortTxType**

OID 1.3.6.1.3.42.2.1.1.5.1.18

Description The FC-0 transmitter type of the Fx\_Port.

**fcFxPortDistance**

OID 1.3.6.1.3.42.2.1.1.5.1.19

Description The FC-0 distance range of the Fx\_Port transmitter.

## Operation Group

This group consists of tables that contain operational status and established service parameters for the fabric element and the attached Nx\_Ports.

---

**Note:** Implementation of this group is mandatory.

---

## Fx\_Port Operation Table

This table contains one entry for each Fx\_Port, the operational status, and parameters of the Fx\_Ports.

### fcFxPortOperTable

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.2.1  |
| Description | A table that contains one entry for each Fx_Port in the fabric element, operational status, and parameters of the Fx_Ports. |

### fcFxPortOperEntry

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.1.1   |
| Description | An entry containing operational status and parameters of an Fx_Port. |
| Index       | fcFxPortOperModuleIndex, fcFxPortOperFxPortIndex                     |

### fcFxPortOperModuleIndex

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.2.1.1.1  |
| Description | Identifies the module containing the Fx_Port for which this entry contains information. |

### fcFxPortOperFxPortIndex

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.1.1.2   |
| Description | Identifies the Fx_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx_Port until the module is reinitialized. |

### fcFxPortID

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.2.1.1.3  |
| Description | The address identifier by which this Fx_Port is identified within the fabric. The Fx_Port might assign its address identifier to its attached Nx_Ports during fabric login. |

### fcFPortAttachedPortName

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.2.1.1.4  |
| Description | The port name of the attached N_Port, if applicable. If the value of this object is '0000000000000000'H, this Fx_Port has no Nx_Port attached to it. This variable has been deprecated and might be implemented for backward compatibility. |

**fcFPortConnectedPort**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.1.1.5   |
| Description | The address identifier of the destination Nx_Port with which this Fx_Port is currently engaged in either a Class 1 or loop connection. If the value of this object is '000000'H, this Fx_Port is not engaged in a connection. This variable has been deprecated and might be implemented for backward compatibility. |

**fcFPortBbCreditAvailable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.1.1.6   |
| Description | The number of buffers currently available for receiving frames from the attached port in the buffer-to-buffer flow control. The value should be less than or equal to fcFPortBbCredit. |

**fcFPortOperMode**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.1.1.7                     |
| Description | The current operational mode of the Fx_Port. |

**fcFPortAdminMode**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.1.1.8                     |
| Description | The desired operational mode of the Fx_Port. |

**Fx\_Port Physical Level Table**

This table contains one entry for each Fx\_Port in the fabric element, and the physical level status and parameters of the Fx\_Ports.

**fcFPortPhysTable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.3   |
| Description | A table that contains, one entry for each Fx_Port in the fabric element, physical level status and parameters of the Fx_Ports. |

**fcFPortPhysEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.2.3.1  |
| Description | An entry containing physical level status and parameters of an Fx_Port. |
| Index       | fcFPortPhysModuleIndex, fcFPortPhysFxPortIndex                          |

**fcFPortPhysModuleIndex**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.2.3.1.1  |
| Description | Identifies the module containing the Fx_Port for which this entry contains information. |

**fcFxPortPhysFxPortIndex**

OID 1.3.6.1.3.42.2.1.2.3.1.2

Description Identifies the Fx\_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx\_Port until the module is reinitialized.

**fcFxPortPhysAdminStatus**

OID 1.3.6.1.3.42.2.1.2.3.1.3

Description The desired state of the Fx\_Port:

- online (1) Place port online.
- offline (2) Take port offline.
- testing (3) Initiate test procedures.

A management station might place the Fx\_Port in a desired state by setting this object accordingly. The testing state (3) indicates that no operational frames can be passed. When a fabric element initializes, all Fx\_Ports start with fcFxPortPhysAdminStatus in the offline state (2). As the result of either explicit management action or per configuration information accessible by the fabric element, fcFxPortPhysAdminStatus is then changed to either the online (1) or testing (3) states or remains in the offline state (2).

**fcFxPortPhysOperStatus**

OID 1.3.6.1.3.42.2.1.2.3.1.4

Description The current operational status of the Fx\_Port:

- online (1) Login can proceed.
- offline (2) Login cannot proceed.
- testing (3) Port is under test.
- link-failure (4) Failure after online testing.

The testing state (3) indicates that no operational frames can be passed. If fcFxPortPhysAdminStatus is offline (2), then fcFxPortPhysOperStatus should be offline (2). If fcFxPortPhysAdminStatus is changed to online (1), then fcFxPortPhysOperStatus should change to 1 (online) if the Fx\_Port is ready to accept fabric login request from the attached Nx\_Port; it should proceed and remain in the link-failure state (4) if and only if there is a fault that prevents it from going to the online state (1).

**fcFxPortPhysLastChange**

OID 1.3.6.1.3.42.2.1.2.3.1.5

Description The value of sysUpTime at the time the Fx\_Port entered its current operational status. A value of 0 indicates that the Fx\_Port's operational status has not changed since the agent last restarted.

**fcFxPortPhysRttov**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.3.1.6   |
| Description | The Receiver_Transmitter_Timeout value of the Fx_Port. This is used by the receiver logic to detect loss of synchronization. |

**Fx\_Port Fabric Login Table**

This table contains one entry for each Fx\_Port in the fabric element, and the service parameters that have been established from the most recent fabric login, whether implicit or explicit.

**fcFxlogiTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.2.4  |
| Description | A table that contains, one entry for each Fx_Port in the fabric element, services parameters established from the most recent fabric login, explicit or implicit. |

**fcFxlogiEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.4.1   |
| Description | An entry containing service parameters established from a successful fabric login. |
| Index       | fcFxloginModuleIndex, fcFxloginFxPortIndex,<br>fcFxloginNxPortIndex                |

**fcFxlogiModuleIndex**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.42.2.1.2.4.1.1  |
| Description | Identifies the module containing the Fx_Port for which this entry contains information. |

**fcFxlogiFxPortIndex**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.4.1.2   |
| Description | Identifies the Fx_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx_Port until the module is reinitialized. |

**fcFxlogiNxPortIndex**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.4.1.3   |
| Description | The object identifies the associated Nx_Port in the attachment for which the entry contains information. |

**fcFxPortFcphVersionAgreed**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.42.2.1.2.4.1.4   |
| Description | The version of FC-PH that the Fx_Port has agreed to support from the fabric login. |

**fcFxPortNxPortBbCredit**

OID 1.3.6.1.3.42.2.1.2.4.1.5

Description The total number of buffers available for holding Class 1 connect-request Class 2 or Class 3 frames to be transmitted to the attached Nx\_Port. It is for buffer-to-buffer flow control in the direction from Fx\_Port to Nx\_Port. The buffer-to-buffer flow control mechanism is indicated in the respective fcFxPortBbCreditModel.

**fcFxPortNxPortRxDataFieldSize**

OID 1.3.6.1.3.42.2.1.2.4.1.6

Description The Receive Data Field Size of the attached Nx\_Port. This is a binary value that specifies the largest Data Field Size for an FT\_1 frame that can be received by the Nx\_Port. The value is a number of bytes in the range 128 to 2112, inclusive.

**fcFxPortCosSuppAgreed**

OID 1.3.6.1.3.42.2.1.2.4.1.7

Description Indicates that the attached Nx\_Port has requested the Fx\_Port for the support of classes of services and the Fx\_Port has granted the request.

**fcFxPortIntermixSuppAgreed**

OID 1.3.6.1.3.42.2.1.2.4.1.8

Description A variable indicating that the attached Nx\_Port has requested the Fx\_Port for Intermix support and the Fx\_Port has granted the request. This flag is valid only if Class 1 service is supported. Possible values are yes (1) or no (2).

**fcFxPortStackedConnModeAgreed**

OID 1.3.6.1.3.42.2.1.2.4.1.9

Description Indicates whether the Fx\_Port has agreed to support stacked connect from the fabric login. This is meaningful only if Class 1 service has been agreed to.

**fcFxPortClass2SeqDelivAgreed**

OID 1.3.6.1.3.42.2.1.2.4.1.10

Description A variable indicating whether the Fx\_Port has agreed to support Class 2 sequential delivery from the fabric login. This is meaningful only if Class 2 service has been agreed. Possible values are yes (1) or no (2).

**fcFxPortClass3SeqDelivAgreed**

OID 1.3.6.1.3.42.2.1.2.4.1.11

Description A flag indicating whether the Fx\_Port has agreed to support Class 3 sequential delivery from the fabric login. This is meaningful only if Class 3 service has been agreed to. Possible values are yes (1) or no (2).



**fcFxPortNxPortName**

OID 1.3.6.1.3.42.2.1.2.4.1.12

Description The port name of the attached Nx\_Port, if applicable. If the value of this object is '0000000000000000'H, this Fx\_Port has no Nx\_Port attached to it.

**fcFxPortConnectedNxPort**

OID 1.3.6.1.3.42.2.1.2.4.1.13

Description The address identifier of the destination Nx\_Port with which this Fx\_Port is currently engaged in either a Class 1 or loop connection. If the value of this object is '000000'H, this Fx\_Port is not engaged in a connection.

**fcFxPortBbCreditModel**

OID 1.3.6.1.3.42.2.1.2.4.1.14

Description Identifies the BB\_Credit model used by the Fx\_Port. The regular model refers to the buffer-to-buffer flow control mechanism defined in FC-PH [1], which is used between the F\_Port and the N\_Port. For FL\_Ports, the alternate buffer-to-buffer flow control mechanism, as defined in FC-AL [4], is used between the FL\_Port and any attached NL\_Ports.

## Error Group

This group consists of tables that contain information about the various types of errors detected. The management station might use the information in this group to determine the quality of the link between the Fx\_Port and its attached Nx\_Port.

Implementation of this group is optional.

## Fx\_Port Error Table

This table contains one entry for each Fx\_Port in the fabric element, and counters recording numbers of errors detected since the management agent reinitialized.

The first six columnar objects after the port index correspond to the counters in the Link ErrorStatus Block.

**fcFxPortErrorTable**

OID 1.3.6.1.3.42.2.1.3.1

Description A table that contains one entry for each Fx\_Port, and counters that record the numbers of errors detected since the management agent reinitialized.

**fcFxPortErrorEntry**

OID 1.3.6.1.3.42.2.1.3.1.1

Description An entry containing error counters of an Fx\_Port.

Index fcFxPortErrorModuleIndex, fcFxPortErrorFxPortIndex

**fcFxPortErrorModuleIndex**

OID 1.3.6.1.3.42.2.1.3.1.1.1

Description Identifies the module containing the Fx\_Port for which this entry contains information.

**fcFxPortErrorFxPortIndex**

OID 1.3.6.1.3.42.2.1.3.1.1.2

Description Identifies the Fx\_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx\_Port until the module is reinitialized.

**fcFxPortLinkFailures**

OID 1.3.6.1.3.42.2.1.3.1.1.3

Description The number of link failures detected by this Fx\_Port.

**fcFxPortSyncLosses**

OID 1.3.6.1.3.42.2.1.3.1.1.4

Description The number of loss of synchronization errors detected by the Fx\_Port.

**fcFxPortSigLosses**

OID 1.3.6.1.3.42.2.1.3.1.1.5

Description The number of loss of signal errors detected by the Fx\_Port.

**fcFxPortPrimSeqProtoErrors**

OID 1.3.6.1.3.42.2.1.3.1.1.6

Description The number of primitive sequence protocol errors detected by the Fx\_Port.

**fcFxPortInvalidTxWords**

OID 1.3.6.1.3.42.2.1.3.1.1.7

Description The number of invalid transmission word errors detected by the Fx\_Port.

**fcFxPortInvalidCrcs**

OID 1.3.6.1.3.42.2.1.3.1.1.8

Description The number of invalid Cyclic Redundancy Checks (CRCs) detected by this Fx\_Port.

**fcFxPortDelimiterErrors**

OID 1.3.6.1.3.42.2.1.3.1.1.9

Description The number of Delimiter errors detected by this Fx\_Port.

**fcFxPortAddressIdErrors**

OID 1.3.6.1.3.42.2.1.3.1.1.10

Description The number of Address Identifier errors detected by this Fx\_Port.

**fcFxPortLinkResetIns**

OID 1.3.6.1.3.42.2.1.3.1.1.11

Description The number of Link Reset Protocol errors received by this Fx\_Port from the attached Nx\_Port.

**fcFxPortLinkResetOuts**

OID 1.3.6.1.3.42.2.1.3.1.1.12

Description The number of Link Reset Protocol errors issued by this Fx\_Port to the attached Nx\_Port.

**fcFxPortOlsIns**

OID 1.3.6.1.3.42.2.1.3.1.1.13

Description The number of Offline Sequence errors received by this Fx\_Port.

**fcFxPortOlsOuts**

OID 1.3.6.1.3.42.2.1.3.1.1.14

Description The number of Offline Sequence errors issued by this Fx\_Port.

## Accounting Group

HP does not support Accounting tables; this section is not applicable.

## Capability Group

This group consists of a table describing information about what each Fx\_Port is inherently capable of operating or supporting. A capability might be used or not, as expressed in its respective object value in the Configuration group.

Implementation of this group is optional.

### Fx\_Port Capability Table

**fcFxPortCapTable**

OID 1.3.6.1.3.42.2.1.5.1

Description A table that contains one entry for each Fx\_Port, and the capabilities of the port within the fabric element.

**fcFxPortCapEntry**

OID 1.3.6.1.3.42.2.1.5.1.1

Description An entry containing the capabilities of an Fx\_Port.

Index fcFxPortCapModuleIndex, fcFxPortCapFxPortIndex

**fcFxPortCapModuleIndex**

OID 1.3.6.1.3.42.2.1.5.1.1.1

Description Identifies the module containing the Fx\_Port for which this entry contains information.

**fcFxPortCapFxPortIndex**

OID 1.3.6.1.3.42.2.1.5.1.1.2

Description Identifies the Fx\_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx\_Port until the module is reinitialized.

**fcFxPortCapFcphVersionHigh**

OID 1.3.6.1.3.42.2.1.5.1.1.3

Description The highest or most recent version of FC-PH that the Fx\_Port is capable of supporting.

**fcFxPortCapFcphVersionLow**

OID 1.3.6.1.3.42.2.1.5.1.1.4

Description The lowest or earliest version of FC-PH that the Fx\_Port is capable of supporting.

**fcFxPortCapBbCreditMax**

OID 1.3.6.1.3.42.2.1.5.1.1.5

Description The maximum number of receive buffers available for holding Class 1 connect-request Class 2 or Class 3 frames from the attached Nx\_Port.

**fcFxPortCapBbCreditMin**

OID 1.3.6.1.3.42.2.1.5.1.1.6

Description The minimum number of receive buffers available for holding Class 1 connect-request Class 2 or Class 3 frames from the attached Nx\_Port.

**fcFxPortCapRxDataFieldSizeMax**

OID 1.3.6.1.3.42.2.1.5.1.1.7

Description The maximum size (in bytes) of the Data Field in a frame that the Fx\_Port is capable of receiving from its attached Nx\_Port.

**fcFxPortCapRxDataFieldSizeMin**

OID 1.3.6.1.3.42.2.1.5.1.1.8

Description The minimum size (in bytes) of the Data Field in a frame that the Fx\_Port is capable of receiving from its attached Nx\_Port.

**fcFxPortCapCos**

OID 1.3.6.1.3.42.2.1.5.1.1.9

Description A value indicating the set of Classes of Service that the Fx\_Port is capable of supporting.

**fcFxPortCapIntermix**

OID 1.3.6.1.3.42.2.1.5.1.1.10

Description A flag indicating whether the Fx\_Port is capable of supporting the intermixing of Class 2 and Class 3 frames during a Class 1 connection. This flag is valid only if the port is capable of supporting Class 1 service. Possible values are yes (1) or no (2).

**fcFxPortCapStackedConnMode**

OID 1.3.6.1.3.42.2.1.5.1.1.11

Description A value indicating the mode of Stacked Connect request that the Fx\_Port is capable of supporting.

**fcFxPortCapClass2SeqDeliv**

OID 1.3.6.1.3.42.2.1.5.1.1.12

Description A flag indicating whether the Fx\_Port is capable of supporting Class 2 Sequential Delivery. Possible values are yes (1) or no (2).

**fcFxPortCapClass3SeqDeliv**

OID 1.3.6.1.3.42.2.1.5.1.1.13

Description A flag indicating whether the Fx\_Port is capable of supporting Class 3 Sequential Delivery. Possible values are yes (1) or no (2).

**fcFxPortCapHoldTimeMax**

OID 1.3.6.1.3.42.2.1.5.1.1.14

Description The maximum holding time (in microseconds) that the Fx\_Port is capable of supporting.

**fcFxPortCapHoldTimeMin**

OID 1.3.6.1.3.42.2.1.5.1.1.15

Description The minimum holding time (in microseconds) that the Fx\_Port is capable of supporting.

**fcFxPortCapBaudRates**

OID 1.3.6.1.3.42.2.1.5.1.1.16

Description A value indicating the set of baud rates that the Fx\_Port is capable of supporting. This variable has been deprecated and might be implemented for backward compatibility.

**fcFxPortCapMedia**

OID 1.3.6.1.3.42.2.1.5.1.1.17

Description A value indicating the set of media that the Fx\_Port is capable of supporting. This variable has been deprecated and might be implemented for backward compatibility.



# Entity MIB Objects

## 4

This chapter provides descriptions and other information specific to Entity MIB object types and discusses the following major topics:

- [Overview](#), page 120
- [Entity MIB Objects](#), page 124
- [Entity MIB Trap](#), page 139
- [Entity MIB Conformance Information](#), page 139

## Overview

Entity MIB is the module for representing multiple logical entities supported by a single SNMP agent. This MIB is supported only in Fabric OS v4.x.

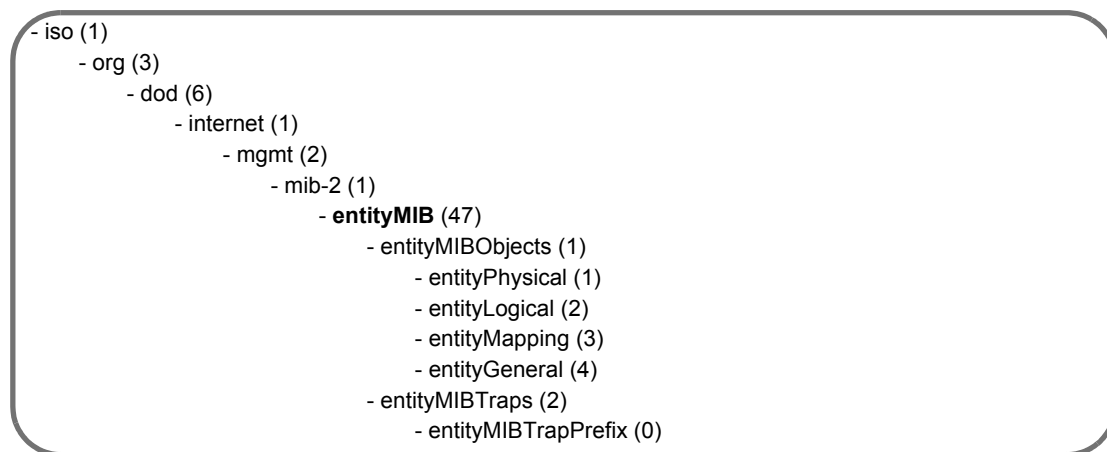
The descriptions of each of the MIB variables in this chapter come directly from Entity MIB itself.

The object types in Entity MIB are organized into the following groupings:

- Entity MIB Objects
- Entity MIB Traps
- Entity Conformance Groups

## Entity MIB System Organization of MIB Objects

Figure 17 and Figure 18 depict the organization and structure of the Entity MIB file system.



**Figure 17: Overall Tree Structure for Entity MIB**



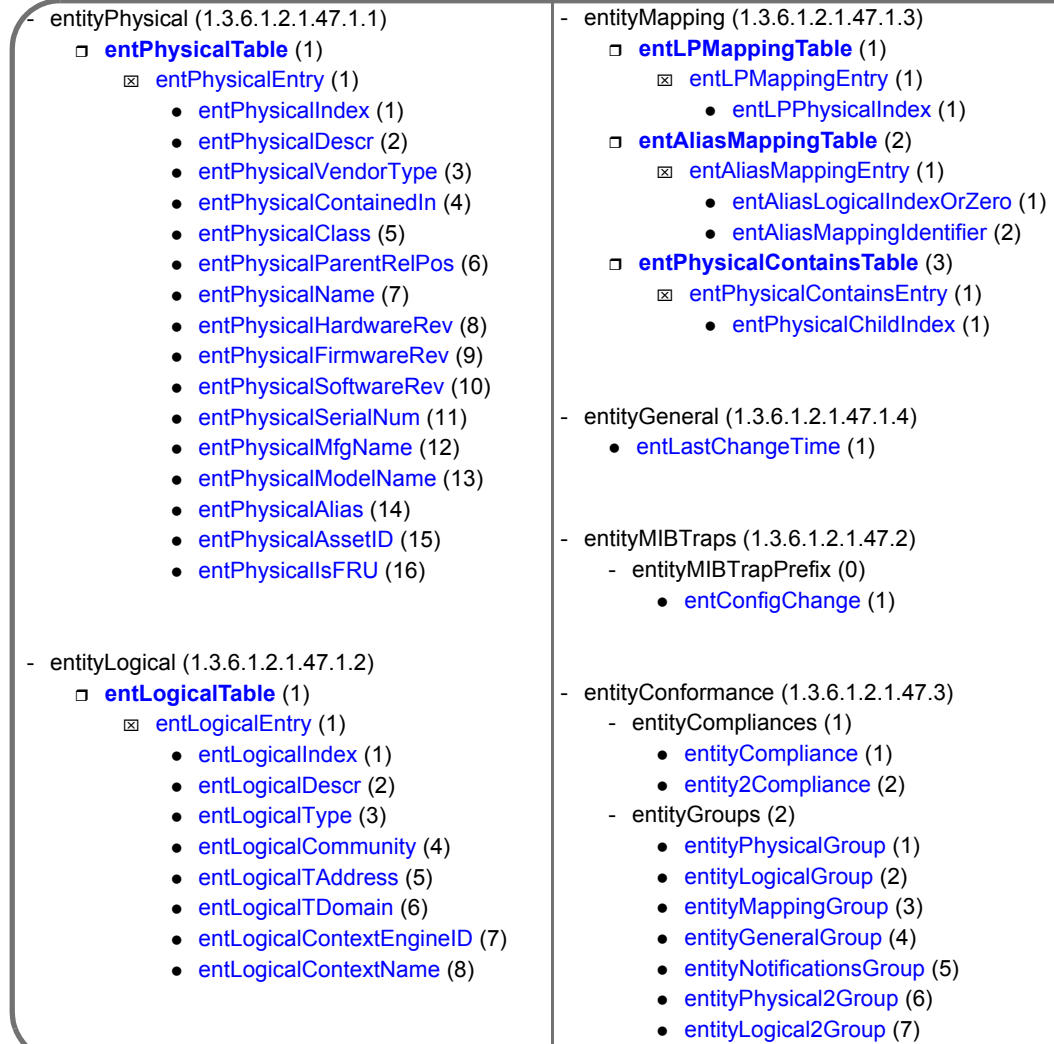


Figure 18: Structure for Entity MIB Objects

## Definitions for Entity MIB

Table 8 lists the objects or definitions that are imported into the Entity MIB and the modules from which they are imported.

**Table 8: Objects Imported into the Entity MIB**

| Object             | Imported from module |
|--------------------|----------------------|
| MODULE-IDENTITY    | SNMPv2-SMI           |
| OBJECT-TYPE        |                      |
| NOTIFICATION-TYPE  |                      |
| mib-2              |                      |
| TDomain            | SNMPv2-TC            |
| TAddress           |                      |
| TEXTUAL-CONVENTION |                      |
| AutonomousType     |                      |
| RowPointer         |                      |
| TimeStamp          |                      |
| TruthValue         |                      |
| MODULE-COMPLIANCE  | SNMPv2-CONF          |
| OBJECT-GROUP       |                      |
| NOTIFICATION-GROUP |                      |
| SnmpAdminString    | SNMP-FRAMEWORK-MIB   |

## Textual Conventions

### PhysicalIndex

Status            Current

Description      Arbitrary value that uniquely identifies the physical entity. Value should be a small positive integer; index values for different physical entities are not necessarily contiguous.

Syntax            Integer (1... 2147483647)

### PhysicalClass

Status            Current

Description      An enumerated value that provides an indication of the general hardware type of a particular physical entity. There are no restrictions as to the number of entPhysicalEntries of each entPhysicalClass, which must be instantiated by an agent. [Table 9](#) shows the PhysicalClass values.

Syntax            Integer

**Table 9: Possible Values for PhysicalClass**

| Value           | Description   |
|-----------------|---|
| other (1)       | The physical entity class is known but does not match any of the supported values.  |
| unknown (2)     | The physical entity class is unknown to the agent.  |
| chassis (3)     | The physical entity class is an overall container for networking equipment. Any class of physical entity except a stack can be contained within a chassis, and a chassis might be contained only within a stack.  |
| backplane (4)   | The physical entity class is a device for aggregating and forwarding networking traffic, such as a shared backplane in a modular Ethernet switch. Note that an agent might model a backplane as a single physical entity, which is actually implemented as multiple discrete physical components (within a chassis or stack).   |
| container (5)   | The physical entity class is capable of containing one or more removable physical entities, possibly of different types (such as a chassis slot or daughter-card holder). For example, each (empty or full) slot in a chassis is modeled as a container. Note that all removable physical entities should be modeled within a container entity, such as field-replaceable modules, fans, or power supplies. Note that all known containers, including empty containers, should be modeled by the agent.           |
| powerSupply (6) | The physical entity class is a power-supplying component.   |
| fan (7)         | The physical entity class is a fan or other heat-reduction component.   |
| sensor (8)      | The physical entity class is a sensor, such as a temperature sensor within a router chassis.  |
| module (9)      | The physical entity class is a self-contained subsystem (such as a plug-in card or daughter-card). If it is removable, then it should be modeled within a container entity; otherwise, it should be modeled directly within another physical entity (for example, a chassis or another module).   |
| port (10)       | The physical entity class is a networking port, capable of receiving or transmitting networking traffic.  |
| stack (11)      | The physical entity class is a super-container (possibly virtual), intended to group together multiple chassis entities (such as a stack of multiple chassis entities). A stack might be realized by a virtual cable or a real interconnect cable attached to multiple chassis, or it can comprise multiple interconnect cables. A stack should not be modeled within any other physical entities, but a stack might be contained within another stack. Only chassis entities should be contained within a stack. |

|                          |  |
|--------------------------|--|
| <b>SnmEngineIdOrNone</b> |  |
| Status                   | Current  |
| Description              | <p>A specially formatted SnmpEngineID string for use with the Entity MIB.</p> <p>If an instance of an object with syntax SnmpEngineIdOrNone has a non-zero length, then the object encoding and semantics are defined by the SnmpEngineID textual convention (refer to RFC 2571 [RFC2571]).</p> <p>If an instance of an object with syntax SnmpEngineIdOrNone contains a zero-length string, then no appropriate SnmpEngineID is associated with the logical entity (that is, SNMPv3 not supported).</p> |
| Syntax                   | OCTET STRING (SIZE(0..32)) Empty string or SnmpEngineID  |

## Entity MIB Objects

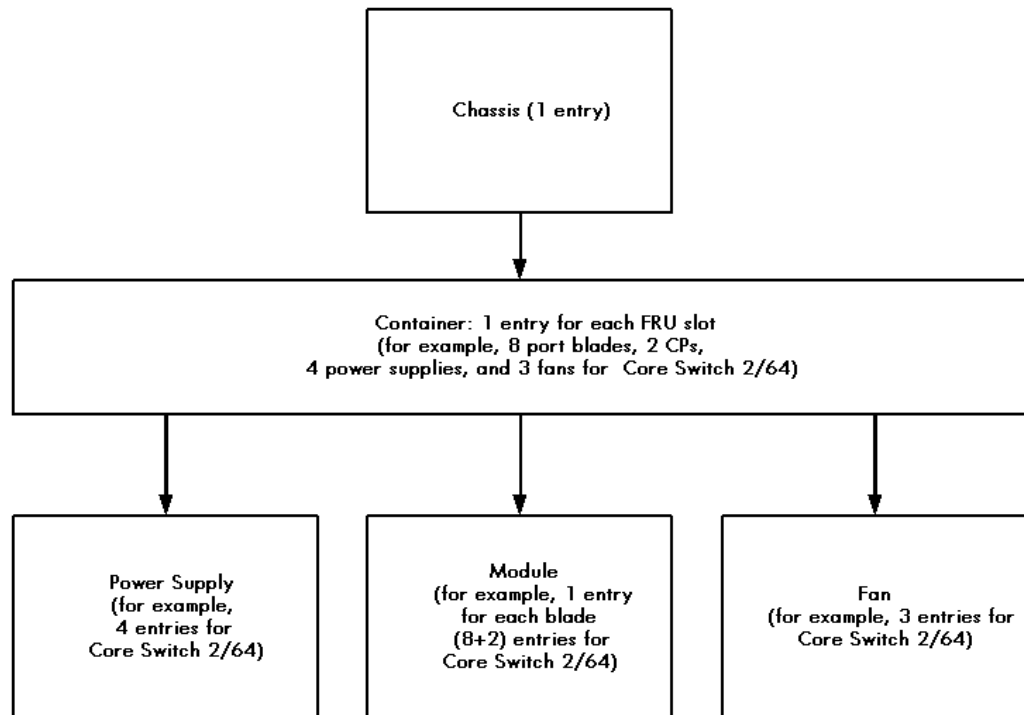
The Entity MIB objects are divided into the following groups:

- [Physical Entity Group](#), page 124
- [Logical Entity Group](#), page 132
- [Entity Mapping Group](#), page 135
- [General Group](#), page 138

The following sections list the MIBs in each group.

### Physical Entity Group

|                         |  |
|-------------------------|--|
| <b>entPhysicalTable</b> |  |
| OID                     | 1.3.6.1.2.1.47.1.1.1   |
| Status                  | Current  |
| Description             | This table contains one row per physical entity (see <a href="#">Figure 19</a> ). The table always contains at least one row for an overall physical entity. |
| Note                    | This object implemented for Fabric OS v4.1 and above.  |



**Figure 19: entPhysicalTable Containment Hierarchy (entPhysicalContainsTable)**

#### **entPhysicalEntry**

OID 1.3.6.1.2.1.47.1.1.1.1

Status Current

Description Information about a particular physical entity.

Each entry provides objects (entPhysicalDescr, entPhysicalVendorType, and entPhysicalClass) to help an NMS identify and characterize the entry, and objects (entPhysicalContainedIn and entPhysicalParentRelPos) to help an NMS relate the particular entry to other entries in this table.

Index entPhysicalIndex

#### **entPhysicalIndex**

OID 1.3.6.1.2.1.47.1.1.1.1.1

Status Current

Description Unique identifier of the physical entity.

**entPhysicalDescr**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.1.1.1.1.2  |
| Status      | Current   |
| Description | A textual description of the physical entity (physical name of the entity, such as chassis, blade, port, and so on). This object should contain a string that identifies the entity manufacturer's name and should be set to a distinct value for each version or model of the physical entity. |
| Note        | The name provides the entity type and number (for example, slot 1, power supply, and so on). The description gives the textual description of the type of the entry (for example, power supply, module, and so on).   |

**entPhysicalVendorType**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.1.1.1.1.3   |
| Status      | Current  |
| Description | <p>An indication of the vendor-specific hardware type of the physical entity. Note that this is different from the definition of MIB-II <code>sysObjectID</code>.</p> <p>An agent should set this object to an enterprise-specific registration identifier value, indicating the specific equipment type in detail. The associated instance of <code>entPhysicalClass</code> indicates the general type of hardware device.</p> <p>If no vendor-specific registration identifier exists for this physical entity, or if the value is unknown by this agent, then the value { 0, 0 } is returned.</p> |
| Note        | Currently, NULL OID { 0, 0 } is returned.  |

**entPhysicalContainedIn**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.1.1.1.1.4   |
| Status      | Current  |
| Description | <p>The value of <code>entPhysicalIndex</code> for the physical entity that contains this physical entity. A value of 0 indicates this physical entity is not contained in any other physical entity. Note that the set of containment relationships defines a strict hierarchy; that is, recursion is not allowed.</p> <p>In the event a physical entity is contained by more than one physical entity (for example, double-wide modules), this object should identify the containing entity with the lowest value of <code>entPhysicalIndex</code>.</p> |
| Note        | Value 0 for chassis entry. All containers have <code>ContainedIn</code> set to 1. All FRUs are contained in their respective slot container entries.   |

**entPhysicalClass**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.1.1.1.1.5  |
| Status      | Current   |
| Description | <p>An indication of the general hardware type of the physical entity.</p> <p>An agent should set this object to the standard enumeration value that most accurately indicates the general class of the physical entity, or the primary class if there is more than one.</p> <p>If no appropriate standard registration identifier exists for this physical entity, then the value other(1) is returned. If the value is unknown by this agent, then the value unknown(2) is returned.</p>   |
| Note        | <p>Core Switch 2/64 and SAN Director 2/128 switches can have the following hierarchy of physical objects:</p> <ul style="list-style-type: none"> <li>— Chassis: One entry (one row)</li> <li>— Container: One entry for each FRU slot (eight port blades + two CPs + four power supplies + three fans)</li> <li>— Module: Eight entries for port blades, two entries for CPs, four entries for power supplies, and three entries for fans.</li> </ul> <p>SAN Switch 2/32 can have the following hierarchy of physical objects:</p> <ul style="list-style-type: none"> <li>— Chassis: One entry (one row)</li> <li>— Container: One entry for each FRU slot (one switch blade + two power supplies + six fans)</li> <li>— Module: One entry for switch blade, up to two entries for power supplies, and up to six entries for fans.</li> </ul> |

**entPhysicalParentRelPos**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.1.1.1.1.6  |
| Status      | Current   |
| Description | <p>An indication of the relative position of this child component among all its sibling components. Sibling components are defined as entPhysicalEntries that share the same instance values of each of the entPhysicalContainedIn and entPhysicalClass objects.</p>  |
| Note        | <p>For chassis entry, this value is -1; for containers, it is the sequential number of the container from the first one; for all FRUs, it is always 1.</p> <p>An NMS can use this object to identify the relative ordering for all sibling components of a particular parent (identified by the entPhysicalContainedIn instance in each sibling entry).</p> <p>This value should match any external labeling of the physical component if possible. For example, for a container (such as a card slot) labeled slot #3, entPhysicalParentRelPos should have the value 3. Note that the entPhysicalEntry for the module plugged into slot 3 should have an entPhysicalParentRelPos value of 1.</p> |

If the physical position of this component does not match any external numbering or clearly visible ordering, then user documentation or other external reference material should be used to determine the parent-relative position. If this is not possible, then the agent should assign a consistent (but possibly arbitrary) ordering to a given set of sibling components, perhaps based on internal representation of the components.

If the agent cannot determine the parent-relative position for some reason, or if the associated value of `entPhysicalContainedIn` is 0, then the value -1 is returned; otherwise, a non-negative integer is returned, indicating the parent-relative position of this physical entity.

Parent-relative ordering normally starts from 1 and continues to  $n$ , where  $n$  represents the highest-positioned child entity. However, if the physical entities (for example, slots) are labeled from a starting position of zero, then the first sibling should be associated with an `entPhysicalParentRelPos` value of 0. Note that this ordering might be sparse or dense, depending on agent implementation.

The actual values returned are not globally meaningful, as each parent component might use different numbering algorithms. The ordering is meaningful only among siblings of the same parent component.

The agent should retain parent-relative position values across reboots, either through algorithmic assignment or use of nonvolatile storage.

**entPhysicalName**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.1.1.1.1.7  |
| Status      | Current   |
| Description | <p>The textual name of the physical entity (physical name of the entity such as chassis, blade, port, and so on). The value of this object should be the name of the component as assigned by the local device and should be suitable for use in commands entered at the device's console. This might be a text name, such as console, or a simple component number (for example, port or module number) such as 1, depending on the physical component naming syntax of the device.</p> <p>If there is no local name, or this object is otherwise not applicable, then this object contains a zero-length string.</p> <p>Note that the value of <code>entPhysicalName</code> for two physical entities is the same in the event that the console interface does not distinguish between them (for example, slot-1 and the card in slot-1).</p> |
| Note        | <p>The name provides the type of the entry and its number (for example, slot 1, power supply, and so on). The description gives the textual description of the type of the entry (for example, power supply, module, and so on).</p>  |



**entPhysicalHardwareRev**

OID 1.3.6.1.2.1.47.1.1.1.1.8

Status Current

Description The vendor-specific hardware revision string for the physical entity. The preferred value is the hardware revision identifier actually printed on the component itself (if present).

Note that if revision information is stored internally in a nonprintable (for example, binary) format, then the agent must convert such information to a printable format, in an implementation-specific manner.

If no specific hardware revision string is associated with the physical component, or if this information is unknown to the agent, this object contains a zero-length string.

Note Set to empty string.

**entPhysicalFirmwareRev**

OID 1.3.6.1.2.1.47.1.1.1.1.9

Status Current

Description The vendor-specific firmware revision string for the physical entity.

Note that if revision information is stored internally in a nonprintable (for example, binary) format, then the agent must convert such information to a printable format, in an implementation-specific manner.

If no specific firmware programs are associated with the physical component, or if this information is unknown to the agent, then this object will contain a zero-length string.

Note Set to empty string.

**entPhysicalSoftwareRev**

OID 1.3.6.1.2.1.47.1.1.1.1.10

Status Current

Description The vendor-specific software revision string for the physical entity.

Note that if revision information is stored internally in a nonprintable (for example, binary) format, the agent must convert such information to a printable format in an implementation-specific manner.

If no specific software programs are associated with the physical component, or if this information is unknown to the agent, then this object will contain a zero-length string.

Note Set to empty string.

**entPhysicalSerialNum**

OID 1.3.6.1.2.1.47.1.1.1.1.11

Status Current

Description The vendor-specific serial number string for the physical entity. The preferred value is the serial number actually printed on the component (if present).

On the first instantiation of a physical entity, the value of entPhysicalSerialNum associated with that entity is set to the correct vendor-assigned serial number, if this information is available to the agent. If a serial number is unknown or nonexistent, the entPhysicalSerialNum is set to a zero-length string instead.

Note that implementations that can correctly identify the serial numbers of all installed physical entities do not need to provide write access to the entPhysicalSerialNum object. Agents that cannot provide nonvolatile storage for the entPhysicalSerialNum strings are not required to implement write access for this object.

Not every physical component has a serial number or even needs one. Physical entities for which the associated value of the entPhysicalIsFRU object is equal to false(2) (for example, the repeater ports within a repeater module) do not need their own unique serial number. An agent does not have to provide write access for such entities and might return a zero-length string.

If write access is implemented for an instance of entPhysicalSerialNum and a value is written into the instance, the agent must retain the supplied value in the entPhysicalSerialNum instance associated with the same physical entity for as long as that entity remains instantiated. This includes instantiations across all reinitializations and reboots of the network management system, including those that result in a change of the physical entity's entPhysicalIndex value.

Note Set to serial number and part number (if available), respectively.

**entPhysicalMfgName**

OID 1.3.6.1.2.1.47.1.1.1.1.12

Status Current

Description The name of the manufacturer of this physical component. The preferred value is the name actually printed on the component (if present).

Note that comparisons between instances of the entPhysicalModelName, entPhysicalFirmwareRev, entPhysicalSoftwareRev, and the entPhysicalSerialNum objects are meaningful only among entPhysicalEntries with the same value of entPhysicalMfgName.

If the manufacturer name string associated with the physical component is unknown to the agent, this object contains a zero-length string.

Note Set to empty string.

**entPhysicalModelName**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.1.1.1.1.13   |
| Status      | Current   |
| Description | <p>The vendor-specific model name associated with this physical component. The preferred value is the customer-visible part number, which might be printed on the component.</p> <p>If the model name string associated with the physical component is unknown to the agent, this object contains a zero-length string.</p> |
| Note        | Set to serial number and part number (if available) respectively.   |

**entPhysicalAlias**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.1.1.1.1.14   |
| Status      | Current   |
| Description | <p>This object is an alias name for the physical entity as specified by a network manager; it provides a nonvolatile handle for the physical entity.</p> <p>On the first instantiation of a physical entity, the value of entPhysicalAlias associated with that entity is set to the zero-length string. However, the agent might set the value to a locally unique default value instead of a zero-length string.</p> <p>If write access is implemented for an instance of entPhysicalAlias and a value is written into the instance, the agent must retain the supplied value in the entPhysicalAlias instance associated with the same physical entity for as long as that entity remains instantiated. This includes instantiations across all reinitializations and reboots of the network management system, including those that result in a change of the physical entity's entPhysicalIndex value.</p> |
| Note        | Set to empty string.  |

**entPhysicalAssetID**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.1.1.1.1.15  |
| Status      | Current  |
| Description | <p>This object is a user-assigned asset tracking identifier for the physical entity as specified by a network manager; it provides nonvolatile storage of this information.</p> <p>On the first instantiation of a physical entity, the value of entPhysicalAssetID associated with that entity is set to the zero-length string.</p> <p>Not every physical component has an asset tracking identifier or even need one. Physical entities for which the associated value of the entPhysicalIsFRU object is equal to false(2) (for example, the repeater ports within a repeater module) do not need their own unique asset tracking identifier. An agent does not have to provide write access for such entities and might instead return a zero-length string.</p> |

If write access is implemented for an instance of `entPhysicalAssetID` and a value is written into the instance, the agent must retain the supplied value in the `entPhysicalAssetID` instance associated with the same physical entity for as long as that entity remains instantiated. This includes instantiations across all reinitializations and reboots of the network management system, including those that result in a change of the physical entity's `entPhysicalIndex` value.

If no asset tracking information is associated with the physical component, then this object contains a zero-length string.

Note Set to empty string.

**entPhysicalIsFRU**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.1.1.1.1.16  |
| Status      | Current  |
| Description | The <code>entPhysicalIsFRU</code> object indicates whether this physical entity is considered a field replaceable unit by the vendor. If this object contains the value true (1), then this <code>entPhysicalEntry</code> identifies a field replaceable unit. For all <code>entPhysicalEntries</code> representing components that are permanently contained within a field replaceable unit, the value false (2) should be returned for this object. |
| Note        | Set to True (1) for FRU entries (port blades, CPs, sensors, power supplies, and fans; False (2) for container and chassis type entries.  |

**entPhysicalContainsTable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.1.3.3   |
| Status      | Current  |
| Description | A table that exposes the container-containee relationships between physical entities. This table provides all the information found by constructing the virtual containment tree for a given <code>entPhysicalTable</code> , but in a more direct format. In the event a physical entity is contained by more than one other physical entity (for example, double-wide modules), this table should include these additional mappings, which cannot be represented in the <code>entPhysicalTable</code> virtual containment tree. |

**Logical Entity Group**

This section lists the `entityLogical` MIBs.

**entLogicalTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.1.2.1  |
| Description | This table contains one row per logical entity. For agents that implement more than one naming scope, at least one entry must exist. Agents that instantiate all MIB objects within a single naming scope are not required to implement this table. |

**entLogicalEntry**

OID 1.3.6.1.2.1.47.1.2.1.1

Description Information about a particular logical entity. Entities might be managed by this agent or other SNMP agents in the same chassis.

Index entLogicalIndex

**entLogicalIndex**

OID 1.3.6.1.2.1.47.1.2.1.1.1

Description The value of this object uniquely identifies the logical entity. The value should be a small positive integer; index values for different logical entities are not necessarily contiguous.

**entLogicalDescr**

OID 1.3.6.1.2.1.47.1.2.1.1.2

Description A textual description of the logical entity. This object should contain a string that identifies the manufacturer's name for the logical entity and should be set to a distinct value for each version of the logical entity.

**entLogicalType**

OID 1.3.6.1.2.1.47.1.2.1.1.3

Description An indication of the type of logical entity. This is typically the Object Identifier name of the node in the SMI's naming hierarchy that represents the major MIB module, or the majority of the MIB modules, supported by the logical entity. For example:

- a logical entity of a regular host or router -> mib-2
- a logical entity of an 802.1d bridge -> dot1dBridge
- a logical entity of an 802.3 repeater -> snmpDot3RptrMgmt

If an appropriate node in the SMI's naming hierarchy cannot be identified, the value mib-2 should be used.

**entLogicalCommunity**

OID 1.3.6.1.2.1.47.1.2.1.1.4

Description An SNMPv1 or SNMPv2C community string, which can be used to access detailed management information for this logical entity. The agent should allow read access with this community string (to an appropriate subset of all managed objects) and might also return a community string based on the privileges of the request used to read this object.

Note that an agent might return a community string with read-only privileges, even if this object is accessed with a read-write community string. However, the agent must take care not to return a community string that allows more privileges than the community string used to access this object.

A compliant SNMP agent might want to conserve naming scopes by representing multiple logical entities in a single default naming scope. This is possible when the logical entities represented by the same value of `entLogicalCommunity` have no object instances in common. For example, `bridge1` and `repeater1` might be part of the main naming scope, but at least one additional community string is needed to represent `bridge2` and `repeater2`.

Logical entities `bridge1` and `repeater1` would be represented by `sysOREntries` associated with the default naming scope.

For agents not accessible through SNMPv1 or SNMPv2C, the value of this object is the empty string. This object might also contain an empty string if a community string has not yet been assigned by the agent, or no community string with suitable access rights can be returned for a particular SNMP request.

Note that this object is deprecated. Agents that implement SNMPv3 access should use the `entLogicalContextEngineID` and `entLogicalContextName` objects to identify the context associated with each logical entity. SNMPv3 agents might return a zero-length string for this object or might continue to return a community string (for example, tri-lingual agent support).

#### **entLogicalTAddress**

OID 1.3.6.1.2.1.47.1.2.1.1.5

Description The transport service address by which the logical entity receives network management traffic, formatted according to the corresponding value of `entLogicalTDomain`.

For `snmpUDPDomain`, a `TAddress` is 6 octets long, the initial 4 octets containing the IP-address in network-byte order and the last 2 containing the UDP port in network-byte order. Consult Transport Mappings for Version 2 of the Simple Network Management Protocol (RFC1906) for further information on `snmpUDPDomain`.

#### **entLogicalTDomain**

OID 1.3.6.1.2.1.47.1.2.1.1.6

Description Indicates the kind of transport service by which the logical entity receives network management traffic. Possible values for this object are currently found in the Transport Mappings for SNMPv2 document (RFC1906).

#### **entLogicalContextEngineID**

OID 1.3.6.1.2.1.47.1.2.1.1.7

Description The authoritative `contextEngineID` that can be used to send an SNMP message concerning information held by this logical entity to the address specified by the associated `entLogicalTAddress/entLogicalTDomain` pair.

This object, together with the associated `entLogicalContextName` object, defines the context associated with a particular logical entity; it allows access to SNMP engines identified by a `contextEngineId` and `contextName` pair.

If no value has been configured by the agent, a zero-length string is returned, or the agent might choose not to instantiate this object at all.

#### **entLogicalContextName**

OID 1.3.6.1.2.1.47.1.2.1.1.8

Description The contextName that sends an SNMP message concerning information held by this logical entity to the address specified by the associated entLogicalTAddress/entLogicalTDomain pair.

This object, together with the associated entLogicalContextEngineID object, defines the context associated with a particular logical entity and allows access to SNMP engines identified by a contextEngineId and contextName pair.

If no value has been configured by the agent, a zero-length string is returned, or the agent might choose not to instantiate this object at all.

## **Entity Mapping Group**

This section lists the entityMapping MIBs.

#### **entLPMappingTable**

OID 1.3.6.1.2.1.47.1.3.1

Description This table contains zero or more rows of logical entity to physical equipment associations. For each logical entity known by this agent, there are zero or more mappings to the physical resources used to realize that logical entity.

An agent should limit the number and nature of entries in this table such that only meaningful and non-redundant information is returned. For example, in a system that contains a single power supply, mappings between logical entities and the power supply are not useful and should not be included.

Also, only the most appropriate physical component that is closest to the root of a particular containment tree should be identified in an entLPMapping entry.

For example, suppose a bridge is realized on a particular module and all ports on that module are ports on this bridge. A mapping between the bridge and the module would be useful, but additional mappings between the bridge and each of the ports on that module would be redundant (since the entPhysicalContainedIn hierarchy can provide the same information). If, however, more than one bridge was utilizing ports on this module, then mappings between each bridge and the ports it used would be appropriate.

Also, in the case of a single backplane repeater, a mapping for the backplane to the single repeater entity is not necessary.

**entLPMappingEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.1.3.1.1   |
| Description | Information about a particular logical entity to physical equipment association. Note that the nature of the association is not specifically identified in this entry. It is expected that sufficient information exists in the MIBs used to manage a particular logical entity to infer how physical component information is utilized. |
| Index       | entLogicalIndex<br>entLPPhysicalIndex  |

**entLPPhysicalIndex**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.1.3.1.1.1   |
| Description | The value of this object identifies the index value of a particular entPhysicalEntry associated with the indicated entLogicalEntity. |

**entAliasMappingTable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.1.3.2   |
| Description | This table contains zero or more rows, representing mappings of logical entity and physical component to external MIB identifiers. Each physical port in the system might be associated with a mapping to an external identifier, which itself is associated with a particular logical entity's naming scope. A wildcard mechanism is provided to indicate that an identifier is associated with more than one logical entity. |

**entAliasMappingEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.1.3.2.1   |
| Description | <p>Information about a particular physical equipment, logical entity to external identifier binding. Each logical entity and physical component pair might be associated with one alias mapping. The logical entity index might also be used as a wildcard (see "<a href="#">entAliasLogicalIndexOrZero</a>" on page 137 object description for details.)</p> <p>Note that only entPhysicalIndex values that represent physical ports (that is, associated entPhysicalClass value is port(10)) are permitted to exist in this table.</p> |
| Index       | entPhysicalIndex<br>entAliasLogicalIndexOrZero   |



**entAliasLogicalIndexOrZero**

OID 1.3.6.1.2.1.47.1.3.2.1.1

**Description** The value of this object identifies the logical entity that defines the naming scope for the associated instance of the entAliasMappingIdentifier object.

If this object has a nonzero value, it identifies the logical entity named by the same value of entLogicalIndex.

If this object has a value of zero, the mapping between the physical component and the alias identifier for this entAliasMapping entry is associated with all unspecified logical entities. That is, a value of zero (the default mapping) identifies any logical entity that does not have an explicit entry in this table for a particular entPhysicalIndex/entAliasMappingIdentifier pair.

For example, to indicate that a particular interface (such as physical component 33) is identified by the same value of ifIndex for all logical entities, the following instance might exist:

```
entAliasMappingIdentifier.33.0 = ifIndex.5
```

In the event an entPhysicalEntry is associated differently for some logical entities, additional entAliasMapping entries might exist:

```
entAliasMappingIdentifier.33.0 = ifIndex.6
entAliasMappingIdentifier.33.4 = ifIndex.1
entAliasMappingIdentifier.33.5 = ifIndex.1
entAliasMappingIdentifier.33.10 = ifIndex.12
```

Note that entries with nonzero entAliasLogicalIndexOrZero index values have precedence over any zero-indexed entry. In this example, all logical entities except 4, 5, and 10 associate physical entity 33 with ifIndex.6.

**entAliasMappingIdentifier**

OID 1.3.6.1.2.1.47.1.3.2.1.2

**Description** The value of this object identifies a particular conceptual row associated with the indicated entPhysicalIndex and entLogicalIndex pair.

Since only physical ports are modeled in this table, only entries that represent interfaces or ports are allowed. If an ifEntry exists on behalf of a particular physical port, this object should identify the associated ifEntry. For repeater ports, the appropriate row in the rpTrPortGroupTable should be identified instead.

For example, suppose a physical port was represented by entPhysicalEntry.3, entLogicalEntry.15 existed for a repeater, and entLogicalEntry.22 existed for a bridge. Then there might be two related instances of entAliasMappingIdentifier:

```
entAliasMappingIdentifier.3.15 == rpTrPortGroupIndex.5.2
entAliasMappingIdentifier.3.22 == ifIndex.17
```

It is possible that other mappings (besides interfaces and repeater ports) might be defined in the future, as required.

Bridge ports are identified by examining the Bridge MIB and appropriate ifEntries associated with each dot1dBasePort and are thus not represented in this table.

**entPhysicalContainsTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.1.3.3  |
| Description | <p>A table that exposes the container-containee relationships between physical entities. This table provides all the information found by constructing the virtual containment tree for a given entPhysicalTable, but in a more direct format.</p> <p>In the event a physical entity is contained by more than one other physical entity (for example, double-wide modules), this table should include these additional mappings, which cannot be represented in the entPhysicalTable virtual containment tree.</p> |

**entPhysicalContainsEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.1.3.3.1                     |
| Description | A single container-containee relationship. |
| Index       | entPhysicalIndex<br>entPhysicalChildIndex  |

**entPhysicalChildIndex**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.1.3.3.1.1  |
| Description | The value of entPhysicalIndex for the contained physical entity. Through this the containment hierarchy of the physical entities is displayed (see <a href="#">Figure 19</a> ). |

**General Group**

This section lists the entityGeneral MIB.

**entLastChangeTime**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.1.4.1   |
| Description | <p>The value of sysUpTime at the time a conceptual row is created, modified, or deleted in any of the following tables:</p> <ul style="list-style-type: none"><li>— entPhysicalTable</li><li>— entLogicalTable</li><li>— entLPMappingTable</li><li>— entAliasMappingTable</li><li>— entPhysicalContainsTable</li></ul> |

## Entity MIB Trap

This section lists the entityMIBTrap objects. [Figure 17](#) on page 120 displays the structure of the entityMIBTraps group.

### entConfigChange

OID 1.3.6.1.2.1.47.2.0.1

Status Current

Description An entConfigChange notification is generated when the value of entLastChangeTime changes. It can be utilized by an NMS to trigger logical or physical entity table maintenance polls.

An agent should not generate more than one entConfigChange notification event in a given time interval (five seconds is the suggested default). A notification event is the transmission of a single trap or inform PDU to a list of notification destinations.

If additional configuration changes occur within the throttling period, then notification events for these changes should be suppressed by the agent until the current throttling period expires. At the end of a throttling period, one notification event should be generated if any configuration changes occurred since the start of the throttling period; in such a case, another throttling period is started right away.

An NMS should periodically check the value of entLastChangeTime to detect any missed entConfigChange notification events: for example, due to throttling or transmission loss.

## Entity MIB Conformance Information

This section lists the entityConformance MIBs. [Figure 17](#) on page 120 shows the structure of the entityConformance group.

### entityCompliance

OID 1.3.6.1.2.1.47.3.1.1

Status Deprecated

Description The compliance statement for SNMP entities that implement version 1 of the Entity MIB.

Module This module

```
MANDATORY-GROUPS {
    entityPhysicalGroup,
    entityLogicalGroup,
    entityMappingGroup,
    entityGeneralGroup,
    entityNotificationsGroup
}
```

**entity2Compliance**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.3.1.2   |
| Status      | Current  |
| Description | The compliance statement for SNMP entities that implement version 2 of the Entity MIB.   |
| Module      | This module<br><br><pre>MANDATORY-GROUPS {<br/>    entityPhysicalGroup,<br/>    entityPhysical2Group,<br/>    entityGeneralGroup,<br/>    entityNotificationsGroup<br/>}</pre>   |
| Group       | entityLogical2Group  |
| Description | Implementation of this group is not mandatory for agents that model all MIB object instances within a single naming scope.   |
| Group       | entityMappingGroup   |
| Description | <p>Implementation of the entPhysicalContainsTable is mandatory for all agents. Implementation of the entLPMMappingTable and entAliasMappingTables are not mandatory for agents that model all MIB object instances within a single naming scope.</p> <p>Note that the entAliasMappingTable might be useful for all agents; however, implementation of the entityLogicalGroup or entityLogical2Group is required to support this table.</p>   |
| Object      | entPhysicalSerialNum   |
| Access      | Not-accessible   |
| Description | <p>Read and write access is not required for agents that cannot identify serial number information for physical entities or cannot provide nonvolatile storage for NMS-assigned serial numbers.</p> <p>Write access is not required for agents that can identify serial number information for physical entities but cannot provide nonvolatile storage for NMS-assigned serial numbers.</p> <p>Write access is not required for physical entities for which the associated value of the entPhysicalIsFRU object is equal to false(2).</p> |
| Object      | entPhysicalAlias   |
| Access      | Read-only  |
| Description | Write access is required only if the associated entPhysicalClass value is equal to chassis(3).   |
| Object      | entPhysicalAssetID   |

|             |   |
|-------------|---|
| Access      | Not-accessible  |
| Description | Read and write access is not required for agents that cannot provide nonvolatile storage for NMS-assigned asset identifiers.<br><br>Write access is not required for physical entities for which the associated value of entPhysicalIsFRU is equal to false(2). |

**entityPhysicalGroup**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.3.2.1  |
| Objects     | entPhysicalDescr<br>entPhysicalVendorType<br>entPhysicalContainedIn<br>entPhysicalClass<br>entPhysicalParentRelPos<br>entPhysicalName |
| Status      | Current   |
| Description | The collection of objects used to represent physical system components for which a single agent provides management information.      |

**entityLogicalGroup**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.3.2.2   |
| Objects     | entLogicalDescr<br>entLogicalType<br>entLogicalCommunity<br>entLogicalTAddress<br>entLogicalTDomain                                |
| Status      | Deprecated   |
| Description | The collection of objects used to represent the list of logical entities for which a single agent provides management information. |

**entityMappingGroup**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.3.2.3  |
| Objects     | entLPPhysicalIndex<br>entAliasMappingIdentifier<br>entPhysicalChildIndex  |
| Status      | Current   |
| Description | The collection of objects used to represent the associations between multiple logical entities, physical components, interfaces, and port identifiers for which a single agent provides management information. |

**entityGeneralGroup**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.2.1.47.3.2.4  |
| Objects     | entLastChangeTime   |
| Status      | Current   |
| Description | The collection of objects that are used to represent general entity information for which a single agent provides management information. |

**entityNotificationsGroup**

|               |  |
|---------------|--|
| OID           | 1.3.6.1.2.1.47.3.2.5   |
| Notifications | entConfigChange  |
| Status        | Current  |
| Description   | The collection of notifications used to indicate Entity MIB data consistency and general status information. |

**entityPhysical2Group**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.3.2.6   |
| Objects     | entPhysicalHardwareRev<br>entPhysicalFirmwareRev<br>entPhysicalSoftwareRev<br>entPhysicalSerialNum<br>entPhysicalMfgName<br>entPhysicalModelName<br>entPhysicalAlias<br>entPhysicalAssetID<br>entPhysicalIsFRU |
| Status      | Current  |
| Description | The collection of objects used to represent physical system components for which a single agent provides management information. This group augments the objects contained in the entityPhysicalGroup.         |

**entityLogical2Group**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.2.1.47.3.2.7   |
| Objects     | entLogicalDescr<br>entLogicalType<br>entLogicalTAddress<br>entLogicalTDomain<br>entLogicalContextEngineID<br>entLogicalContextName       |
| Status      | Current  |
| Description | The collection of objects used to represent the list of logical entities for which a single SNMP entity provides management information. |

# SW MIB Objects

## 5

This chapter contains descriptions and other information specific to FC Switch MIB (SW-MIB) object types. This chapter discusses the following major topics:

- [Overview](#), page 144
- [sw Traps](#), page 151
- [System Group](#), page 155
- [Fabric Group](#), page 164
- [SW Agent Configuration Group](#), page 167
- [Fibre Channel Port Group](#), page 168
- [Name Server Database Group](#), page 173
- [Event Group](#), page 175
- [Fabric Watch Group](#), page 177
- [End Device Group](#), page 185
- [All Groups](#), page 187
- [ASIC Performance Monitoring Group](#), page 188
- [Trunking Group](#), page 190

## Overview

The descriptions of the MIB variables in this chapter come directly from the FC Switch MIB.

## SW-MIB System Organization of MIB Objects

Figure 20 through Figure 23 show the organization and structure of SW-MIB.

```

- iso (1)
  - org (3)
    - dod (6)
      - internet (1)
        - private (4)
          - enterprises (1)
            - bsci (1588)
              - commDev (2)
                - fibreChannel (1)
                  - fcSwitch (1)
                    - sw (1)
                    - swTrapsV2 (0)
                    - swSystem (1)
                    - swFabric (2)
                    - swModule (3)
                    - swAgtCfg (4)
                    - swFCport (6)
                    - swNs (7)
                    - swEvent (8)
                    - swFwSystem (10)
                    - swEndDevice (21)
                    - swGroup (22)
                    - swBlmPerfMnt (23)
                    - swTrunk (24)
                    - sw28k (2)
                    - sw21kN24k (3)
                    - sw20x0 (4)
              - bsciReg (3)
                - bsciModules (1)
                  - sw21kN24k (3)
                  - sw20x0 (4)
            - bsciReg (3)
              - bsciModules (1)

```

**Figure 20: SW-MIB Overall Tree Structure**



- swTrapsV2 (1.3.6.1.4.1.1588.2.1.1.1.0)
  - swFault (1)
  - swSensorScn (superseded by swFabricWatchTrap) (2)
  - swFCPortScn (3)
  - swEventTrap (4)
  - swFabricWatchTrap (5)
  - swTrackChangesTrap (6)
- swSystem (1.3.6.1.4.1.1588.2.1.1.1.1)
  - swCurrentDate (1)
  - swBootDate (2)
  - swFWLastUpdated (3)
  - swFlashLastUpdated (4)
  - swBootPromLastUpdated (5)
  - swFirmwareVersion (6)
  - swOperStatus (7)
  - swAdmStatus (8)
  - swTelnetShellAdmStatus (9)
  - swSsn (10)
  - swFlashDLOperStatus (11)
  - swFlashDLAdmStatus (12)
  - swFlashDLHost (13)
  - swFlashDLUser (14)
  - swFlashDLFile (15)
  - swFlashDLPassword (16)
  - swBeaconOperStatus (18)
  - swBeaconAdmStatus (19)
  - swDiagResult (20)
  - swNumSensors (21)
  - swSensorTable (22)
    - ⊗ swSensorEntry (1)
      - swSensorIndex (1)
      - swSensorType (2)
      - swSensorStatus (3)
      - swSensorValue (4)
      - swSensorInfo (5)
  - swTrackChangesInfo (23)
  - swID (24)
  - swEtherIPAddress (25)
  - swEtherIPMask (26)
  - swFCIPAddress (27)
  - swFCIPMask (28)
- swFabric (1.3.6.1.4.1.1588.2.1.1.1.2)
  - swDomainID (1)
  - swPrincipalSwitch (2)
  - swNumNbs (8)
  - swNbTable (9)
    - ⊗ swNbEntry (1)
      - swNbIndex (1)
      - swNbMyPort (2)
      - swNbRemDomain (3)
      - swNbRemPort (4)
      - swNbBaudRate (5)
      - swNbIsState (6)
      - swNbIsCost (7)
      - swNbRemPortName (8)
  - swFabricMemTable (10)
    - ⊗ swFabricMemEntry (1)
      - swFabricMemWwn (1)
      - swFabricMemDid (2)
      - swFabricMemName (3)
      - swFabricMemEIP (4)
      - swFabricMemFCIP (5)
      - swFabricMemGWIP (6)
      - swFabricMemType (7)
      - swFabricMemShortVersion (8)
      - swIDIDMode (11)
- swModule (1.3.6.1.4.1.1588.2.1.1.1.3)
- swAgtCfg (1.3.6.1.4.1.1588.2.1.1.1.4)
  - swAgtCmtyTable (11)
    - ⊗ swAgtCmtyEntry (1)
      - swAgtCmtyIdx (1)
      - swAgtCmtyStr (2)
      - swAgtTrapRcp (3)

Figure 21: Tree Structure for swTrapsV2, swSystem, swFabric, swModule, and swAgtCfg

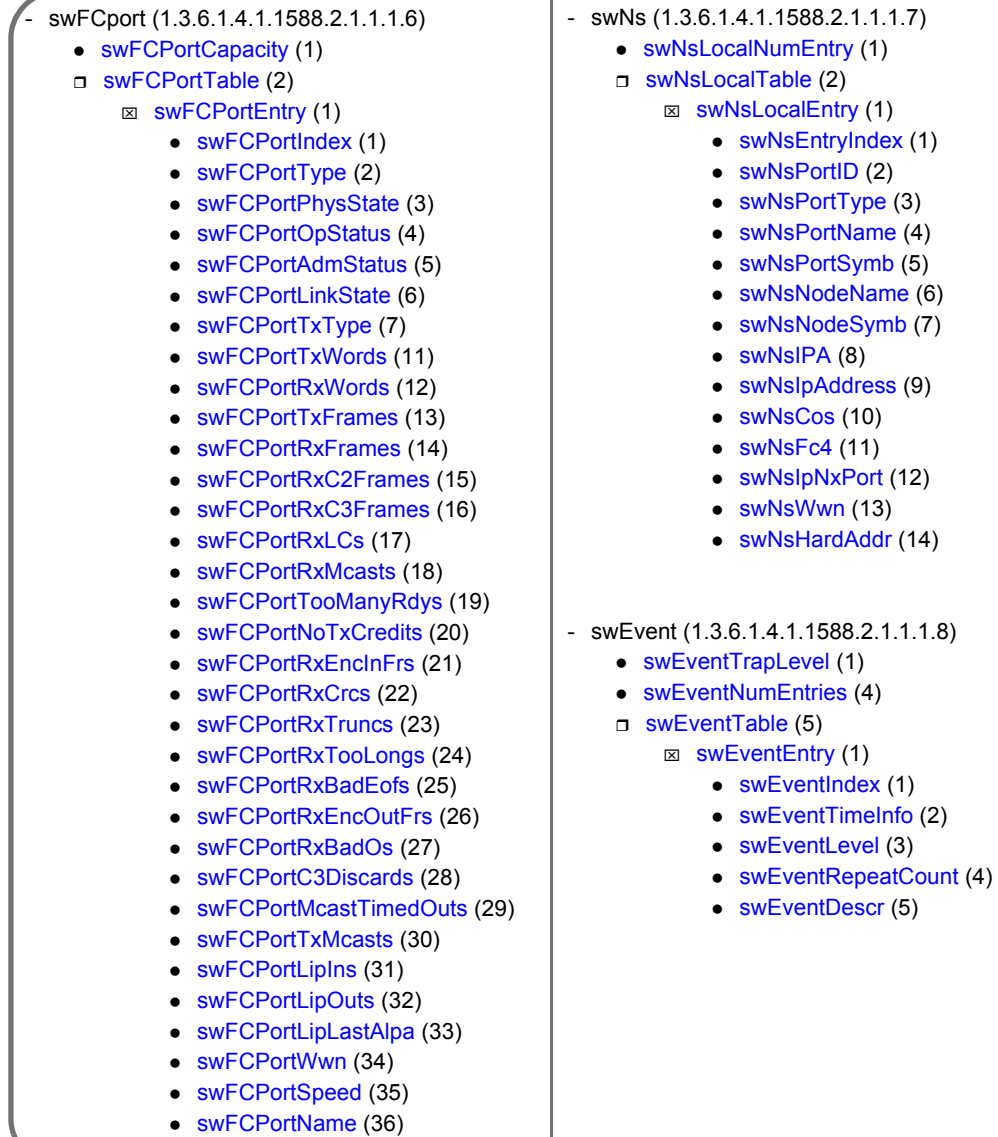


Figure 22: Tree Structure for swFCport, swNs, and swEvent Groups

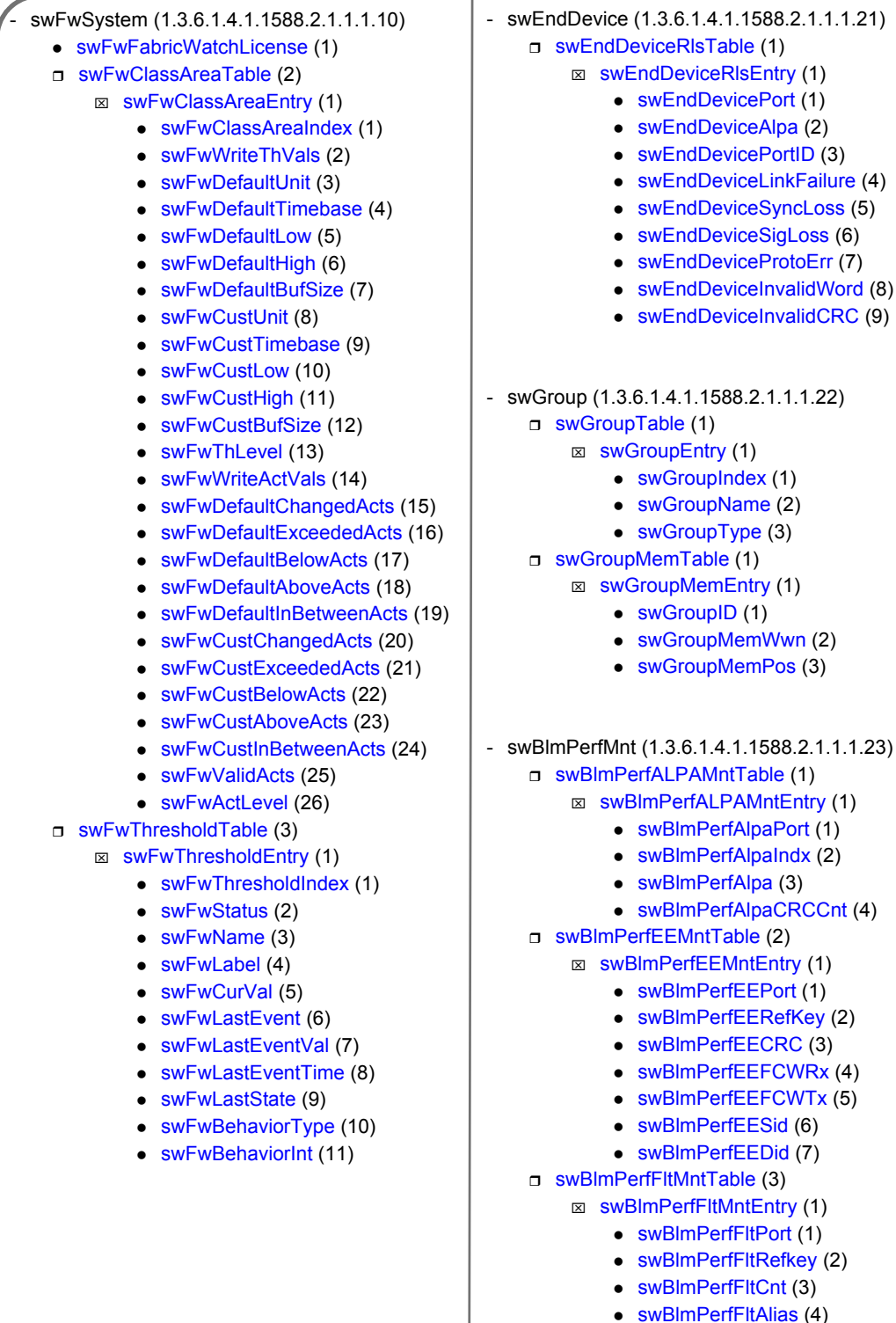
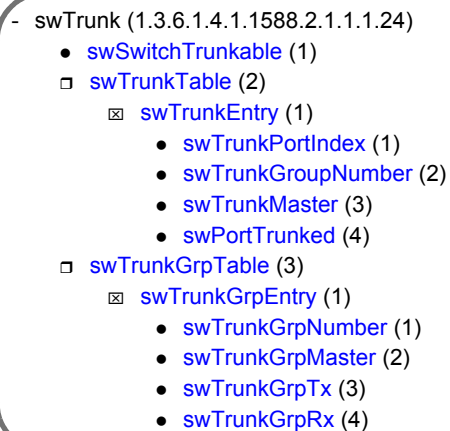


Figure 23: Tree Structure for swFwSystem, swEndDevice, swGroup, and swBlmPerfMnt



```
- swTrunk (1.3.6.1.4.1.1588.2.1.1.1.24)
  • swSwitchTrunkable (1)
  □ swTrunkTable (2)
    ☒ swTrunkEntry (1)
      • swTrunkPortIndex (1)
      • swTrunkGroupNumber (2)
      • swTrunkMaster (3)
      • swPortTrunked (4)
  □ swTrunkGrpTable (3)
    ☒ swTrunkGrpEntry (1)
      • swTrunkGrpNumber (1)
      • swTrunkGrpMaster (2)
      • swTrunkGrpTx (3)
      • swTrunkGrpRx (4)
```

The diagram shows a tree structure for the `swTrunk` group. It is enclosed in a rounded rectangle with a vertical line separating the text from an empty space on the right. The tree starts with a root node `swTrunk (1.3.6.1.4.1.1588.2.1.1.1.24)`. It has two main branches: `swSwitchTrunkable (1)` and `swTrunkTable (2)`. `swTrunkTable (2)` contains `swTrunkEntry (1)`, which has four sub-objects: `swTrunkPortIndex (1)`, `swTrunkGroupNumber (2)`, `swTrunkMaster (3)`, and `swPortTrunked (4)`. Additionally, `swTrunkTable (2)` contains `swTrunkGrpTable (3)`, which contains `swTrunkGrpEntry (1)`. This entry has four sub-objects: `swTrunkGrpNumber (1)`, `swTrunkGrpMaster (2)`, `swTrunkGrpTx (3)`, and `swTrunkGrpRx (4)`. The nodes are represented by different symbols: a dash for the root, a bullet for `swSwitchTrunkable`, a square for `swTrunkTable` and `swTrunkGrpTable`, and a square with an 'x' for `swTrunkEntry` and `swTrunkGrpEntry`.

Figure 24: Tree Structure for the `swTrunk` Group

## Text Conventions for SW-MIB

The conventions in [Table 10](#) are used for SW-MIB.

Table 10: SW-MIB Text Conventions

| Type Definition | Value                     | Description  |
|-----------------|---------------------------|--|
| fcWwn           | Octet String of size 8    | The World Wide Name (WWN) of products and ports.   |
| swDomainIndex   | Integer of size 1 to 239  | Fibre Channel domain ID of the switch.   |
| swNbIndex       | Integer of size 1 to 2048 | Index of the neighbor inter-switch link (ISL) entry.   |
| swSensorIndex   | Integer of size 1 to 1024 | Index of the sensor entry.   |
| swPortIndex     | Integer32                 | Index of the port, starting from 1 up to the maximum number of ports on the switch.  |
| swTrunkMaster   | Integer32                 | Index of the trunk master, starting from 1 up to the maximum number of trunk groups on the switch.   |
| swFwActs        | Integer                   | Valid action matrix:<br>0swFwNoAction<br>1swFwErrlog<br>2swFwSnmpttrap<br>3swFwErrlogSnmpttrap<br>4swFwPortloglock<br>5swFwErrlogPortloglock<br>6swFwSnmpttrapPortloglock<br>7swFwErrlogSnmpttrapPortloglock<br>8swFwRn<br>9swFwElRn<br>10swFwStRn<br>11swFwElStRn<br>12swFwPIRn<br>13swFwElPIRn<br>14swFwStPIRn<br>15swFwElStPIRn<br>16swFwMailAlert<br>17swFwMailAlertErrlog<br>18swFwMailAlertSnmpttrap<br>19swFwMailAlertErrlogSnmpttrap<br>20swFwMailAlertPortloglock<br>21swFwMailAlertErrlogPortloglock<br>22swFwMailAlertSnmpttrapPortloglock<br>23swFwMailAlertErrlogSnmpttrapPortloglock<br>24swFwMailAlertRn<br>25swFwElMailAlertRn<br>26swFwMailAlertStRn<br>27swFwMailAlertElStRn<br>28swFwMailAlertPIRn<br>29swFwMailAlertElPIRn<br>30swFwMailAlertStPIRn<br>31swFwMailAlertElStPIRn |
| swFwLevels      | Integer                   | Threshold values or action matrix level:<br>1swFwReserved<br>2swFwDefault<br>3swFwCustom   |

**Table 10: SW-MIB Text Conventions (Continued)**

| Type Definition  | Value   | Description  |
|------------------|---------|--|
| swFwClassesAreas | Integer | Classes and area index:<br>1swFwEnvTemp<br>2swFwEnvFan<br>3swFwEnvPs<br>4swFwTransceiverTemp<br>5swFwTransceiverRxp<br>6swFwTransceiverTxp<br>7swFwTransceiverCurrent<br>8swFwPortLink<br>9swFwPortSync<br>10swFwPortSignal<br>11swFwPortPe<br>12swFwPortWords<br>13swFwPortCrcs<br>14swFwPortRXPerf<br>15swFwPortTXPerf<br>16swFwPortState<br>17swFwFabricEd<br>18swFwFabricFr<br>19swFwFabricDi<br>20swFwFabricSc<br>21swFwFabricZc<br>22swFwFabricFq<br>23swFwFabricFl<br>24swFwFabricGs<br>25swFwEPortLink<br>26swFwEPortSync<br>27swFwEPortSignal<br>28swFwEPortPe<br>29swFwEPortWords<br>30swFwEPortCrcs<br>31swFwEPortRXPerf<br>32swFwEPortTXPerf<br>33swFwEPortState<br>34swFwFCUPortLink<br>35swFwFCUPortSync<br>36swFwFCUPortSignal<br>37swFwFCUPortPe<br>38swFwFCUPortWords<br>39swFwPortCrcs<br>40swFwFCUPortRXPerf<br>41swFwFCUPortTXPerf |
| swFwWriteVals    | Integer | Write-only variable for applying or canceling values or action matrix changes:<br>1swFwCancelWrite<br>2swFwApplyWrite  |
| swFwTimebase     | Integer | Timebase for thresholds:<br>1swFwTbNone<br>2swFwTbSec<br>3swFwTbMin<br>4swFwTbHour<br>5swFwTbDay   |
| swFwStatus       | Integer | Status for thresholds:<br>1disabled<br>2enabled  |

**Table 10: SW-MIB Text Conventions (Continued)**

| Type Definition | Value   | Description   |
|-----------------|---------|---|
| swFwEvent       | Integer | Possible events available:<br>1started<br>2changed<br>3exceeded<br>4below<br>5above<br>6inBetween |
| swFwBehavior    | Integer | Behavior type for thresholds:<br>1triggered<br>2continuous  |
| swFwState       | Integer | State type for last events:<br>1swFwInformative<br>2swFwNormal<br>3swFwfaulty                     |
| swFwLicense     | Integer | License state:<br>1swFwLicensed<br>2swFwNotLicensed   |

## sw Traps

This section contains descriptions and other information specific to sw Trap types.

---

**Note:** The `swSsn` variable is optional in trap messages. The `swGroupName`, `swGroupType`, and `swGroupMemPos` variables are optional in trap messages in v2.6.x. Each of these optional variables can be set on or off using the `snmpMibCapSet` command.

---

### swFault

|            |  |
|------------|--|
| Trap #     | 1  |
| OID        | 1.3.6.1.4.1.1588.2.1.1.1.0.1                   |
| Enterprise | sw   |
| Variables  | <code>swDiagResult</code> , <code>swSsn</code> |

Description A swFault (1) is generated whenever the diagnostics detect a fault with the switch.

Example Diagnostics:

```
#TYPE          Switch is faulty.
#SUMMARY       Faulty reason: %d and SSN is
               #%s
#ARGUMENTS    0, 1
#SEVERITY      Critical
#TIMEINDEX     1
#STATE         Nonoperational
```

Note Not supported.

**swSensorScn (superseded by swFabricWatchTrap)**

Trap # 2

OID 1.3.6.1.4.1.1588.2.1.1.1.0.2

Enterprise sw

Variables [swSensorStatus](#), [swSensorIndex](#), [swSensorType](#),  
[swSensorValue](#), [swSensorInfo](#), [swSsn](#)

Description An swSensorScn (2) is generated whenever an environment sensor changes its operational state: for instance, if a fan stops working. The VarBind in the Trap Data Unit contains the corresponding instance of the sensor status, sensor index, sensor type, sensor value (reading), and sensor information. Note that the sensor information contains the type of sensor and its number in text format.

|            |  |
|------------|--|
| #TYPE      | A sensor (temperature, fan, or other) changed its operational state. |
| #SUMMARY   | %s: is currently in state %d and SSN is #s                           |
| #ARGUMENTS | 4, 0, 5  |
| #SEVERITY  | Informational  |
| #TIMEINDEX | 1  |
| #STATE     | Operational  |



**swFCPortScn**

Trap # 3

OID 1.3.6.1.4.1.1588.2.1.1.1.0.3

Enterprise sw

Variables [swFCPortOpStatus](#), [swFCPortIndex](#), [swFCPortName](#), [swSsn](#)

Description An swFCPortScn (3) is generated whenever an FC\_Port changes its operational state: for instance, the FC\_Port goes from online to offline. The VarBind in the Trap Data Unit contains the corresponding instance of the FC\_Port's operational status, index, swFCPortName, and swSsn. The swFCPortName and swSsn are optional.

|            |  |
|------------|--|
| #TYPE      | A Fibre Channel Port changed its operational state.            |
| #SUMMARY   | Port Index %d changed state to %d. Port Name: %s and SSN is #s |
| #ARGUMENTS | 1, 0, 2, 3   |
| #SEVERITY  | Informational  |
| #TIMEINDEX | 1  |
| #STATE     | Operational  |

**swEventTrap**

Trap # 4

OID 1.3.6.1.4.1.1588.2.1.1.1.0.4

Enterprise sw

Variables [swEventIndex](#), [swEventTimeInfo](#), [swEventLevel](#), [swEventRepeatCount](#), [swEventDescr](#), [swSsn](#)

Description This trap is generated when an event occurs with a level that is at or below [swEventTrapLevel](#).

|            |   |
|------------|---|
| #TYPE      | A firmware event has been logged.               |
| #SUMMARY   | Event %d: %s (severity level %d) - %s SSN is #s |
| #ARGUMENTS | 0, 1, 2, 4, 5                                   |
| #SEVERITY  | Informational                                   |
| #TIMEINDEX | 1   |
| #STATE     | Operational                                     |

Note The trap is generated when an entry is created in Error Log.

**swFabricWatchTrap**

Trap # 5

OID 1.3.6.1.4.1.1588.2.1.1.1.0.5

Enterprise sw

Variables [swFwClassAreaIndex](#), [swFwThresholdIndex](#), [swFwName](#),  
[swFwLabel](#), [swFwLastEvent](#), [swFwLastEventVal](#),  
[swFwLastEventTime](#), [swFwLastState](#), [swSsn](#)

Description Trap to be sent by Fabric Watch to notify of an event.

|            |  |
|------------|--|
| #TYPE      | Fabric Watch has generated an event.   |
| #SUMMARY   | Threshold %s in Class/Area %d at index %d has generated event %d with %d on %s. This event is %d and SSN is # %s |
| #ARGUMENTS | 2, 0, 1, 6, 4, 5, 7, 8   |
| #SEVERITY  | Warning  |
| #TIMEINDEX | 1  |
| #STATE     | Operational  |

**swTrackChangesTrap**

Trap # 6

OID 1.3.6.1.4.1.1588.2.1.1.1.0.6

Enterprise sw

Variables [swTrackChangesInfo](#), [swSsn](#)

Description Trap to be sent for tracking login, logout, and configuration changes.

|            |                                     |
|------------|-------------------------------------|
| #TYPE      | Track changes has generated a trap. |
| #SUMMARY   | %s and SSN is # %s                  |
| #ARGUMENTS | 0, 1                                |
| #SEVERITY  | Informational                       |
| #TIMEINDEX | 1                                   |
| #STATE     | Operational                         |

## System Group

### **swCurrentDate**

OID 1.3.6.1.4.1.1588.2.1.1.1.1

Description The current date and time.

Note The return string displays using the following format:

ddd MMM DD hh:mm:ss yyyy

Where:

ddd = day

MMM = month

DD = date

hh = hour

mm = minute

ss = seconds

yyyy = year

Example:

Thu Aug 17 15:16:09 2000

### **swBootDate**

OID 1.3.6.1.4.1.1588.2.1.1.1.2

Description The date and time when the system last booted.

Note The return string displays using the following format:

ddd MMM DD hh:mm:ss yyyy

Where:

ddd = day

MMM = month

DD = date

hh = hour

mm = minute

ss = seconds

yyyy = year

Example:

Thu Aug 17 15:16:09 2003

**swFWLastUpdated**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.3

Description The date and time when the firmware was last loaded to the switch.

Note The return string displays using the following format:

ddd MMM DD hh:mm:ss yyyy

Where:

ddd = day

MMM = month

DD = date

hh = hour

mm = minute

ss = seconds

yyyy = year

Example:

Thu Aug 17 15:16:09 2003

**swFlashLastUpdated**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.4

Description The date and time when the firmware was last downloaded or the configuration file was last changed.

Note The return string displays using the following format:

ddd MMM DD hh:mm:ss yyyy

Where:

ddd = day

MMM = month

DD = date

hh = hour

mm = minute

ss = seconds

yyyy = year

Example:

Thu Aug 17 15:16:09 2003

**swBootPromLastUpdated**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.1.5   |
| Description | The date and time when the BootPROM was last updated.  |
| Note        | The return string displays using the following format:<br>ddd MMM DD hh:mm:ss yyyy<br>Where:<br>ddd = day<br>MMM = month<br>DD = date<br>hh = hour<br>mm = minute<br>ss = seconds<br>yyyy = year<br>Example:<br>Thu Aug 17 15:16:09 2003 |

**swFirmwareVersion**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.1.6   |
| Description | The current version of the firmware.   |
| Note        | The return value is displayed using the following format:<br>vM.m.f<br>Where:<br>v = deployment indicator<br>M = major version<br>m = minor version<br>f = software maintenance version<br>Example:<br>v2 . 2 . 1 (indicating FOS version 2.2.1) |

**swOperStatus**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.1.7   |
| Description | The current operational status of the switch. Possible values are:<br>— online (1) The switch is accessible by an external Fibre Channel port.<br>— offline (2) The switch is not accessible.<br>— testing (3) The switch is in a built-in test mode and is not accessible by an external Fibre Channel port.<br>— faulty (4) The switch is not operational. |

**swAdmStatus**

|     |                              |
|-----|------------------------------|
| OID | 1.3.6.1.4.1.1588.2.1.1.1.1.8 |
|-----|------------------------------|

|             |   |
|-------------|---|
| Description | <p>The desired administrative status of the switch. A management station might place the switch in a desired state by setting this object accordingly. Possible values are:</p> <ul style="list-style-type: none"><li>— online (1) Set the switch to be accessible by an external Fibre Channel port.</li><li>— offline (2) Set the switch to be inaccessible.</li><li>— testing (3) Set the switch to run the built-in test.</li><li>— faulty (4) Set the switch to a “soft” faulty condition.</li><li>— reboot (5) Set the chassis to reboot in 1 second.</li><li>— fastboot (6) Set the chassis to fastboot in 1 second. Fastboot causes the chassis to boot but omit the POST.</li><li>— switchReboot (7) Set the current switch to reboot in 1 second.</li></ul> |
| Note        | <p>When the switch is in faulty state, only two states can be set: faulty and reboot/fastboot/switchReboot.</p> <p>The testing (3), faulty (4), and switchReboot (7) values are not applicable with the SAN Switch 2/32.</p> <p>The switchReboot (7) value applies only to the Core Switch 2/64 and SAN Director 2/128.</p>   |

**swTelnetShellAdmStatus**

---

**Note:** This object is applicable to Fabric OS v2.x and v3.x only.

---

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.1.9  |
| Description | <p>The desired administrative status of the Telnet shell. Possible values are:</p> <ul style="list-style-type: none"><li>— unknown (0) The status of the current Telnet shell task is unknown.</li><li>— terminated (1) The current Telnet shell task is deleted.</li></ul> |
| Note        | <p>For v2.x and v3.x: By setting it to 1 (terminated), the current Telnet shell task is deleted. When this variable instance is read, it reports the value last set through SNMP.</p> <p>For v4.x: Not Supported.</p>   |

**swSsn**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.1.10                          |
| Description | The soft serial number of the switch.                  |
| Note        | By default, the return value is the WWN of the switch. |

## Flash Administration

The next six objects are related to firmware or configuration file management. The underlying method in the transfer of the firmware or configuration file is based on either FTP or remote shell. If a password is provided, then FTP is used. If no password is provided, the remote shell is used.

Use one of the two following methods to manage the firmware or switch configuration file in the switch flash.

### Method 1

Set `swFlashDLHost.0`, `swFlashDLUser.0`, and `swFlashDLFile.0` to appropriate host IP address in dot notation (for example, 192.168.1.7), user name (for example, administrator), and file name of the firmware or configuration file (for example, /home/fcsw/v2.2), respectively.

### Method 2

1. Set `swFlashDLPassword.0` to an appropriate value (for example, secret) if FTP is the desired method of transfer.
2. Set `swFlashDLAdmStatus.0` to 3 (`swCfUpload`) or 4 (`swCfDownload`), accordingly.

#### **swFlashDLOperStatus**

OID 1.3.6.1.4.1.1588.2.1.1.1.11

Description The operational status of the flash. Possible values are:

- unknown (0)
- `swCurrent` (1) The flash contains the current firmware image or configuration file.
- `swFwUpgraded` (2) The flash contains the image upgraded from the `swFlashDLHost.0`.
- `swCfUploaded` (3) The switch configuration file has been uploaded to the host.
- `swCfDownloaded` (4) The switch configuration file has been downloaded from the host.
- `swFwCorrupted` (5) The firmware in the flash of the switch is corrupted.

#### **swFlashDLAdmStatus**

---

**Note:** Supported in v2.x and v3.x only.

---

OID 1.3.6.1.4.1.1588.2.1.1.1.12

Description The desired state of the flash.

The host is specified in `swFlashDLHost.0`. In addition, the user name is specified in `swFlashDLUser.0` and the file name specified in `swFlashDLFile.0`. Possible values are:

- `swCurrent` (1) The flash contains the current firmware image or configuration file.

- swCfUpload (3) The switch configuration file is to be uploaded to the host specified.
- swCfDownload (4) The switch configuration file is to be downloaded from the host specified.
- swFwCorrupted (5) The firmware in the flash is corrupted. This value is for informational purposes only; however, setting swFlashDLAdmStatus to this value is not allowed.

Note For more information about the `configDownload` and `configUpload` commands, refer to the *HP StorageWorks Fabric OS 4.2.x Command Reference Guide*.

**swFlashDLHost**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.13

Description The name or IP address (in dot notation) of the host to download or upload a relevant file to or from the flash.

**swFlashDLUser**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.14

Description The user name is used on the host for downloading or uploading a relevant file to or from the flash.

**swFlashDLFile**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.15

Description The name of the file to be downloaded or uploaded.

**swFlashDLPassword**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.16

Description The password to be used for FTP transfer of files in the download or upload operation.

**swBeaconOperStatus**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.18

Description The current operational status of the switch beacon. Possible values are:

- on (1) The LEDs on the front panel of the switch run alternately from left to right and right to left. The color is yellow.
- off (2) Each LED is in its regular status, indicating color and state.

**swBeaconAdmStatus**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.19

Description The desired status of the switch beacon. Possible values are:

- on (1) The LEDs on the front panel of the switch run alternately from left to right and right to left. Set the color to yellow.
- off (2) Set each LED to its regular status, indicating color and state.



**swDiagResult**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.20

Description The result of the power-on self-test (POST) diagnostics. Possible values are:

- sw-ok (1) The switch is okay.
- sw-faulty (2) The switch has experienced an unknown fault.
- sw-embedded-port-fault (3) The switch has experienced an embedded port fault.

**swNumSensors**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.21

Description The number of sensors inside the switch.

Note For example, the SAN Switch 2/16 value is between 1 and 13 (temperature = 6, fan = 3, power supply = 4). The value might vary depending on the switch model. For Fabric OS v4.x, if no sensor is available, this variable is assigned the value -1.

**swSensorTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22

Description Table of sensor entries.

**swSensorEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22.1

Description An entry of the sensor information.

Index swSensorIndex

**swSensorIndex**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.1

Description The index of the sensor.

Note The values are 1 through the value in swNumSensors.

**swSensorType**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.2

Description The type of sensor.

**swSensorStatus**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.3

Description The current status of the sensor. Possible values are:

- unknown (1) The status of the sensor is unknown.
- faulty (2) The status of the sensor is faulty.
- below-min (3) The sensor value is below the minimal threshold.
- nominal (4) The status of the sensor is nominal.

- above-max (5) The sensor value is above the maximum threshold.

- absent (6) The sensor is missing.

Note The following list shows the valid values:

- For temperature, valid values include 3 (below-min), 4 (nominal), and 5 (above max).

- For fan, valid values include 3 (below-min), 4 (nominal), and 6 (absent).

- For power supply, valid values include 2 (faulty), 4 (nominal), and 6 (absent).

#### **swSensorValue**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.4

Description The current value (reading) of the sensor.

The value -2147483648 represents an unknown quantity; it also means that the sensor does not have the capability to measure the actual value. In v2.0, the temperature sensor value is in Celsius, the fan value is in RPM (revolutions per minute), and the power supply sensor reading is unknown.

Note The unknown value -2147483648 indicates the maximum value of integer value  $2^{32}$ .

#### **swSensorInfo**

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.5

Description Additional information on the sensor. It contains the sensor type and number, in textual format; for example, Temp 3 or Fan 6.

#### **HP StorageWorks SAN Switch 2/16:**

- For swSensorIndex 1 through 5, valid return values include:

- Temp #1

- Temp #2

- Temp #3

- Temp #4

- Temp #5

- For swSensorIndex 6 through 11, valid return values include:

- Fan #1

- Fan #2

- Fan #3

- Fan #4

- Fan #5

- Fan #6

- For swSensorIndex 12 and 13, valid return values include:

- Power Supply #1

- Power Supply #2

**Core Switch 2/64 and SAN Director 2/128:**

- Return values for the Core Switch 2/64 and SAN Director 2/128 depend upon the configuration of your system.

**swTrackChangesInfo**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.23   |
| Description | Track changes string; for trap only.  |
| Note        | If there are no events to track, the default return value is <code>No event so far</code> . If there are events to track, the following are valid return values: <ul style="list-style-type: none"> <li>— Successful login</li> <li>— Unsuccessful login</li> <li>— Logout</li> <li>— Configuration file change from task [<i>name of task</i>]</li> <li>— Track-changes on</li> <li>— Track-changes off</li> </ul> |

**swID**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.24                       |
| Description | The number of the logical switch (either 0 or 1). |

**swEtherIPAddress**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.25                                      |
| Description | The IP address of the Ethernet interface of this logical switch. |

**swEtherIPMask**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.26                                   |
| Description | The IP mask of the Ethernet interface of this logical switch. |

**swFCIPAddress**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.27                                |
| Description | The IP address of the FC interface of this logical switch. |

**swFCIPMask**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.28                             |
| Description | The IP mask of the FC interface of this logical switch. |

## Fabric Group

### **swDomainID**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.1

Description The current Fibre Channel domain ID of the switch. To set a new value, the switch (swAdmStatus) must be in offline or testing state.

### **swPrincipalSwitch**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.2

Description Indicates whether the switch is the principal switch, yes (1) or no (2), as per FC-SW.

### **swNumNbs**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.8

Description The number of inter-switch links (ISLs) in the (immediate) neighborhood.

### **swNbTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9

Description This table contains the ISLs in the immediate neighborhood of the switch.

### **swNbEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1

Description An entry containing each neighbor's ISL parameters.

Index swNbIndex

### **swNbIndex**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.1

Description The index for neighborhood entry.

### **swNbMyPort**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.2

Description This is the port that has an ISL to another switch.

Note This value is the same as the physical port number of the local switch +1. The valid values for the Core Switch 2/64 and SAN Director 2/128 switch are 1 through the maximum number of ports.

### **swNbRemDomain**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.3

Description This is the Fibre Channel domain on the other end of the ISL.

Note This is the domain ID of the remote switch. Valid values are 1 through 239 as defined by FCS-SW.

**swNbRemPort**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.4

Description This is the port index on the other end of the ISL.

Note The physical port number of the remote switch, plus 1. The valid values for the Core Switch 2/64 and SAN Director 2/128 switch are 0 through the maximum number of ports.

**swNbBaudRate**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.5

Description The baud rate of the ISL. Possible values are:

- other (1) None of the following.
- oneEighth (2) 155 Mbaud.
- quarter (4) 266 Mbaud.
- half (8) 532 Mbaud.
- full (16) 1 Gbaud.
- double (32) 2 Gbaud.
- quadruple (64) 4 Gbaud.

Note The valid values for the Core Switch 2/64 and SAN Director 2/128 switch are 16 (full) and 32 (double).

**swNbIsIState**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.6

Description The current state of the ISL.

**swNbIsICost**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.7

Description The current link cost of the ISL. In other words, the cost of a link to control the routing algorithm.

**swNbRemPortName**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.8

Description The WWN of the remote port.

**swFabricMemTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.2.10

Description This table contains information on the member switches of a fabric. This might not be available on all versions of Fabric OS.

Note Available on v2.6.1.

**swFabricMemEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.2.10.1                |
| Description | An entry containing each switch in the fabric. |
| Index       | swFabricMemWwn                                 |

**swFabricMemWwn**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.1                                |
| Description | This object identifies the World Wide Name of the member switch. |

**swFabricMemDid**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.2                          |
| Description | This object identifies the domain ID of the member switch. |

**swFabricMemName**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.3                     |
| Description | This object identifies the name of the member switch. |

**swFabricMemEIP**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.4                                    |
| Description | This object identifies the Ethernet IP address of the member switch. |

**swFabricMemFCIP**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.5   |
| Description | This object identifies the Fibre Channel IP address of the member switch. |

**swFabricMemGWIP**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.6                                   |
| Description | This object identifies the Gateway IP address of the member switch. |

**swFabricMemType**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.7              |
| Description | This object identifies the member switch type. |

**swFabricMemShortVersion**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.8   |
| Description | This object identifies the Fabric OS version of the member switch.                              |
| Note        | Provides the short version of the Fabric OS version number. It gives v260 for Fabric OS v2.6.x. |

**swIDIDMode**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.2.11  |
| Description | This identifies the status of Insistent Domain ID (IDID) mode. Status indicates whether IDID mode is enabled or not. |

## SW Agent Configuration Group

**swAgtCmtyTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.4.11   |
| Description | A table that contains one entry for each community, the access control, and parameters of the community.  |
| Note        | The table displays all of the community strings (read and write) if it is accessed by the write community string. Only read community strings are displayed if it is accessed by the read community string.<br><br>In Secure Fabric OS, the community strings can be modified only on the primary switch. |

**swAgtCmtyEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.4.11.1               |
| Description | An entry containing the community parameters. |
| Index       | swAgtCmtyIdx                                  |

**swAgtCmtyIdx**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.4.11.1.1               |
| Description | The SNMPv1 community entry.                     |
| Note        | The return value for this entry is 1 through 6. |

**swAgtCmtyStr**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.4.11.1.2   |
| Description | This is a community string supported by the agent. If a new value is set successfully, it takes effect immediately.   |
| Note        | Default values for communities are as follows: <ul style="list-style-type: none"> <li>— 1 (Secret Code)</li> <li>— 2 (OrigEquipMfr)</li> <li>— 3 (private)</li> <li>— 4 (public)</li> <li>— 5 (common)</li> <li>— 6 (FibreChannel)</li> </ul> Community strings 1-3 are read-write and strings 4-6 are read-only. |

You can change the community setting using the `agtCfgSet` Telnet command.

**swAgtTrapRcp**

OID 1.3.6.1.4.1.1588.2.1.1.1.4.11.1.3

Description This is the trap recipient associated with the community. If a new value is set successfully, it takes effect immediately.

Note If not otherwise set, the default IP address for this trap recipient is 0.0.0.0 and the SNMP trap is not sent for the associated community string.

With a setting of non-0.0.0.0 IP address, SNMP traps are sent to the host with the associated community string.

Any or all of the trap recipients can be configured to send a trap for the associated community string. The maximum number of trap recipients that can be configured is six. If no trap recipient is configured, no traps are sent.

The trap recipient IP address should be part of the Access Control List for Fabric OS v2.6.1, v3.1, and v4.x (see the `agtCfgSet` command).

## Fibre Channel Port Group

This group contains information about the physical state, operational status, performance, and error statistics of each Fibre Channel port on the switch. A Fibre Channel port is one which supports the Fibre Channel protocol, such as F\_Port, E\_Port, U\_Port, or FL\_Port.

**swFCPortCapacity**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.1

Description The maximum number of Fibre Channel ports on this switch. It includes U\_Port, F\_Port, FL\_Port, and any other types of Fibre Channel port.

Note The valid values for Core Switch 2/64 and SAN Director 2/128 switch vary, according to the configuration of the switch. For example, one of the values could be 64.

**swFCPortTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2

Description A table that contains, one entry for each switch port, configuration and service parameters of the port.

**swFCPortEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1

Description An entry containing the configuration and service parameters of the switch port.

Index swFCPortIndex



**swFCPortIndex**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.1

Description The switch port index.

Note The physical port number of the switch, plus 1. The valid values for the Core Switch 2/64 and SAN Director 2/128 are 0 through maximum number of ports.

**swFCPortType**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.2

Description The type of ASIC for the switch port. Possible values are:

- stitch (1)
- flannel (2)
- loom (3) (HP StorageWorks 1 GB switches)
- bloom (4) (HP StorageWorks 2 GB switches)
- rdbloom (5)
- wormhole (6)

Note The valid value for the Core Switch 2/64 is 4.

**swFCPortPhysState**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.3

Description The physical state of the port. Possible values are:

- noCard (1) No card is present in this switch slot.
- noTransceiver (2) No transceiver module in this port (transceiver is the generic name for GBIC, SFP, and so on).
- laserFault (3) The module is signaling a laser fault (defective GBIC).
- noLight (4) The module is not receiving light.
- noSync (5) The module is receiving light but is out of sync.
- inSync (6) The module is receiving light and is in sync.
- portFault (7) The port is marked faulty (defective GBIC, cable, or device).
- diagFault (8) The port failed diagnostics (defective G\_Port or FL\_Port card or motherboard).
- lockRef (9) Port is locking to the reference signal.

**swFCPortOpStatus**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.4

Description The operational status of the port. Possible values are:

- unknown (0) The port module is physically absent.
- online (1) User frames can be passed.
- offline (2) No user frames can be passed.
- testing (3) No user frames can be passed.
- faulty (4) The port module is physically faulty.

**swFCPortAdmStatus**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.5  |
| Description | The desired state of the port. A management station might place the port in a desired state by setting this object accordingly. Possible values are: <ul style="list-style-type: none"><li>— online (1) User frames can be passed.</li><li>— offline (2) No user frames can be passed.</li><li>— testing (3) No user frames can be passed.</li><li>— faulty (4) No user frames can be passed.</li></ul> |
| Note        | For v3.x: The 3 (testing) state indicates that no user frames can be passed. As the result of either explicit management action or per configuration information accessible by the switch, swFCPortAdmStatus is then changed to either the 1 (online) or 3 (testing) states or remains in the 2 (offline) state.<br>For v4.x: The 3 (testing) state is not supported.                                   |

**swFCPortLinkState**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.6   |
| Description | Indicates the link state of the port. <ul style="list-style-type: none"><li>— enabled (1) The port is allowed to participate in the FC-PH protocol with its attached port (or ports if it is in an FC-AL loop).</li><li>— disabled (2) The port is not allowed to participate in the FC-PH protocol with its attached ports.</li><li>— loopback (3) The port might transmit frames through an internal path to verify the health of the transmitter and receiver path.</li></ul> |
| Note        | When the port's link state changes, its operational status (swFCPortOpStatus) is affected.   |

**swFCPortTxType**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.7  |
| Description | Indicates the media transmitter type of the port. Possible values are: <ul style="list-style-type: none"><li>— unknown (1) Cannot determine the port driver.</li><li>— lw (2) Long wave laser.</li><li>— sw (3) Short wave laser.</li><li>— ld (4) Long wave LED.</li><li>— cu (5) Copper (electrical).</li></ul> |

**swFCPortTxWords**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.11                                  |
| Description | Counts the number of Fibre Channel words the port has transmitted. |

**swFCPortRxWords**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.12                               |
| Description | Counts the number of Fibre Channel words the port has received. |

**swFCPortTxFrames**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.13

Description Counts the number of Fibre Channel frames the port has transmitted.

**swFCPortRxFrames**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.14

Description Counts the number of Fibre Channel frames the port has received.

**swFCPortRxC2Frames**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.15

Description Counts the number of Class 2 frames the port has received.

**swFCPortRxC3Frames**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.16

Description Counts the number of Class 3 frames the port has received.

**swFCPortRxCs**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.17

Description Counts the number of link control frames the port has received.

**swFCPortRxMcasts**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.18

Description Counts the number of multicast frames the port has received.

**swFCPortTooManyRdys**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.19

Description Counts the number of times that RDYs exceed the frames received.

**swFCPortNoTxCredits**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.20

Description Counts the number of times the transmit credit has reached 0.

**swFCPortRxEnclnFrs**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.21

Description Counts the number of encoding error or disparity error inside frames received.

**swFCPortRxCrcs**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.22

Description Counts the number of CRC errors detected for frames received.

**swFCPortRxTruncs**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.23

Description Counts the number of truncated frames the port has received.

**swFCPortRxTooLongs**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.24

Description Counts the number of received frames that are too long.

**swFCPortRxBadEofs**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.25

Description Counts the number of received frames that have bad EOF delimiters.

**swFCPortRxEncOutFrs**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.26

Description Counts the number of encoding errors or disparity errors outside frames received.

**swFCPortRxBadOs**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.27

Description Counts the number of invalid ordered sets received.

**swFCPortC3Discards**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.28

Description Counts the number of Class 3 frames the port discarded.

**swFCPortMcastTimedOuts**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.29

Description Counts the number of multicast frames that have timed out.

**swFCPortTxMcasts**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.30

Description Counts the number of multicast frames transmitted.

**swFCPortLipIns**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.31

Description Counts the number of loop initializations initiated by loop devices attached.

**swFCPortLipOuts**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.32

Description Counts the number of loop initializations initiated by the port.

**swFCPortLipLastAlpa**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.33

Description Indicates the physical address (AL\_PA) of the loop device that initiated the last loop initialization.

**swFCPortWwn**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.34

Description The WWN of the Fibre Channel port. The contents of an instance are in IEEE extended format, as specified in FC-PH.

**swFCPortSpeed**

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.35

Description The desired baud rate for the port.  
The default baud rate is 1GB or 2GB.

**swFCPortName**


---

**Note:** Supported in Fabric OS v4.1 and above.

---

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.36

Description A string that indicates the name of the addressed port.  
The names should be persistent across switch reboots. Port names do not have to be unique within a switch or within a fabric.

## Name Server Database Group

**swNsLocalNumEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.1

Description The number of local Name Server entries.

**swNsLocalTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2

Description The table of local Name Server entries.

**swNsLocalEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1

Description An entry from the local Name Server database.

Index swNsEntryIndex

**swNsEntryIndex**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.1

Description The index of the Name Server database entry.

**swNsPortID**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.2

Description The Fibre Channel port address ID of the entry.

**swNsPortType**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.3

Description The type of port for this entry. Possible values, as defined in FC-GS-2, are:

- unknown (0)
- nPort (1)
- nlPort (2)

**swNsPortName**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.4

Description The Fibre Channel WWN of the port entry.

**swNsPortSymb**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.5

Description The contents of a symbolic name of the port entry. In FC-GS-2, a symbolic name consists of a byte array of 1 through 256 bytes, and the first byte of the array specifies the length of its contents. This object variable corresponds to the contents of the symbolic name, with the first byte removed.

**swNsNodeName**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.6

Description The Fibre Channel WWN of the associated node, as defined in FC-GS-2.

**swNsNodeSymb**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.7

Description The contents of a Symbolic Name of the node associated with the entry. In FC-GS-2, a Symbolic Name consists of a byte array of 1 through 256 bytes, and the first byte of the array specifies the length of its contents. This object variable corresponds to the contents of the Symbolic Name, with the first byte removed.

**swNsIPA**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.8

Description The Initial Process Associators of the node for the entry as defined in FC-GS-2.

**swNsIpAddress**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.9

Description The IP address of the node for the entry as defined in FC-GS-2. The format of the address is in IPv6.

**swNsCos**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.10

Description The class of services supported by the port.

**swNsFc4**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.11

Description The FC-4s supported by the port, as defined in FC-GS-2.

**swNsIpNxPort**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.12

Description The object identifies IpAddress of the Nx\_Port for the entry.

**swNsWwn**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.13

Description The object identifies the World Wide Name (WWN) of the Fx\_Port for the entry.

**swNsHardAddr**

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.14

Description The object identifies the 24-bit hard address of the node for the entry.

## Event Group

Logically, the swEventTable is separate from the error log since it is essentially a view of the error log within a particular time window. The value of swEventIndex indicates the number of events that have occurred since the switch booted. The values range from 1 through 2048 entries.

**swEventTrapLevel**

OID 1.3.6.1.4.1.1588.2.1.1.1.8.1

Description Specifies the swEventTrap level in conjunction with an event's severity level. When an event occurs, if its severity level is at or below the specified numeric value, the agent sends the associated swEventTrap to the configured recipients. Possible values are:

- none (0)
- critical (1)
- error (2)
- warning (3)
- informational (4)
- debug (5)

For example, if this variable is set to 3 (warning), all error logs of severity 1 (critical), 2 (error), and 3 (warning) are sent as an SNMP trap of swEventTrap, as shown in [swEventTrap](#) on page 153.

**swEventNumEntries**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.8.4   |
| Description | The number of entries in the Event Table. Valid values vary for each Fabric OS (the values range from 1 through 2048 entries). |

**swEventTable**

|             |                              |
|-------------|------------------------------|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.8.5 |
| Description | The table of event entries.  |

**swEventEntry**

|             |                                |
|-------------|--------------------------------|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.8.5.1 |
| Description | An entry of the event table.   |
| Index       | swEventIndex                   |

**swEventIndex**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.1                                   |
| Description | The index of the event entry.                                      |
| Note        | For Fabric OS v3.x and v2.6.x, the maximum number of events is 64. |

**swEventTimeInfo**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.2  |
| Description | <p>The date and time that this event occurred.</p> <p>The return string is displayed using the following format:</p> <p>MMM DD hh:mm:ss</p> <p>Where:</p> <p>MMM = Month</p> <p>DD = Date</p> <p>hh = Hour</p> <p>mm = Minute</p> <p>ss = Seconds</p> <p>Example: (Fabric OS v3.0 only)</p> <p>Aug 17 15:16:09.</p> |

**swEventLevel**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.3   |
| Description | <p>The severity level of this event entry. Possible values are:</p> <ul style="list-style-type: none"><li>— critical (1)</li><li>— error (2)</li><li>— warning (3)</li><li>— informational (4)</li><li>— debug (5)</li></ul> |



**swEventRepeatCount**

OID 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.4

Description If the most recent event is the same as the previous, this number increments by 1, and is the count of consecutive times this particular event has occurred.

**swEventDescr**

OID 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.5

Description A textual description of the event.

For more information on error messages, refer to the *HP StorageWorks Diagnostics and System Error Messages 4.2.x Reference Guide*.

## Fabric Watch Group

The Fabric Watch group contains one license scalar and two tables.

- The license scalar, `swFwFabricWatchLicense`, tells whether the switch has a proper license for Fabric Watch.
- One table, “[swFwClassAreaTable](#)” on page 177, contains classArea information such as threshold unit string, time base, low thresholds, and so forth. `swFwClassAreaEntry` contains control information for particular class or area thresholds.
- The other table, “[swFwThresholdTable](#)” on page 182, contains individual threshold information such as name, label, last event, and so forth. The thresholds are contained in `swFwThresholdEntry`.

**swFwFabricWatchLicense**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.1

Description If the license key is installed on the switch for Fabric Watch, the return value is `swFwLicensed`; otherwise, the value is `swFwNotLicensed`.

**swFwClassAreaTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2

Description The table of classes and areas.

**swFwClassAreaEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1

Description An entry of the classes and areas.

Index `swFwClassAreaIndex`

**swFwClassAreaIndex**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.1

Description This index represents the Fabric Watch `classArea` combination.

**swFwWriteThVals**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.2

Description This applies or cancels the configuration value changes.

Note For a read operation, the return value is always swFwCancelWrite.  
The following custom configuration variables can be modified:

- swFwCustUnit
- swFwCustTimebase
- swFwCustLow
- swFwCustHigh
- swFwCustBufSize

Changes to these custom configuration variables can be saved by setting this variable to swFwApplyWrite; they can be removed by setting this variable to swFwCancelWrite.

**swFwDefaultUnit**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.3

Description A default unit string name, used to identify the unit of measure for a Fabric Watch classArea combination.

Example:

- C = environment (class), temperature (area).
- RPM = environment (class), fan (area).

**swFwDefaultTimebase**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.4

Description A default polling period for the Fabric Watch classArea combination.

Example:

- swFwTbMin = port (class), link loss (area).
- swFwTbNone = environment (class), temperature (area).

**swFwDefaultLow**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.5

Description A default low threshold value.

**swFwDefaultHigh**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.6

Description A default high threshold value.

**swFwDefaultBufSize**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.7

Description A default buffer size value.

**swFwCustUnit**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.8

Description A customizable unit string name, used to identify the unit of measure for a Fabric Watch classArea combination.

Example:

- C = environment (class), temperature (area).
- RPM = environment (class), fan (area).

**swFwCustTimebase**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.9

Description A customizable polling period for the Fabric Watch classArea combination. For example:

- swFwTbMin = port (class), link loss (area).
- swFwTbNone = environment (class), temperature (area).

**swFwCustLow**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.10

Description A customizable low-threshold value for a Fabric Watch classArea combination.

**swFwCustHigh**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.11

Description A customizable high-threshold value for a Fabric Watch classArea combination.

**swFwCustBufSize**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.12

Description A customizable buffer size value for a Fabric Watch classArea combination.

**swFwThLevel**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.13

Description swFwThLevel is used to point to the current level for classArea values. It is either default or custom.

Note For a read operation, the return value is either 2 (swFwDefault) or 3 (swFwCustom). The value 1 (swFwReserved) is obsolete.

If the write operation sets the variable to 2 (swFwDefault), the following default configuration variables are used for the Fabric Watch classArea combination:

- swFwDefaultUnit
- swFwDefaultTimebase
- swFwDefaultLow

- swFwDefaultHigh
- swFwDefaultBufSize

If the write operation sets the variable to 3 (swFwCustom), the following custom configuration variables are used for the Fabric Watch classArea combination:

- swFwCustUnit
- swFwCustTimebase
- swFwCustLow
- swFwCustHigh
- swFwCustBufSize

**swFwWriteActVals**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.14

Description This applies or cancels the alarm value changes.

Note For a read operation, the return value is always swFwCancelWrite.

The following are the custom alarm variables that can be modified:

- swFwCustChangedActs
- swFwCustExceededActs
- swFwCustBelowActs
- swFwCustAboveActs
- swFwCustInBetweenActs

Changes to these custom alarm variables can be saved by setting this variable to swFwApplyWrite.

Changes to these custom alarm variables can be removed by setting this variable to swFwCancelWrite.

**swFwDefaultChangedActs**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.15

Description Default action matrix for changed event.

**swFwDefaultExceededActs**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.16

Description Default action matrix for an exceeded event. The exceeded value might be either above the high threshold or below the low threshold.

**swFwDefaultBelowActs**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.17

Description Default action matrix for below event.

**swFwDefaultAboveActs**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.18

Description Default action matrix for above event.

**swFwDefaultInBetweenActs**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.19

Description Default action matrix for in-between event.

**swFwCustChangedActs**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.20

Description Custom action matrix for changed event.

**swFwCustExceededActs**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.21

Description Custom action matrix for an exceeded event.

**swFwCustBelowActs**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.22

Description Custom action matrix for below event.

**swFwCustAboveActs**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.23

Description Custom action matrix for above event.

**swFwCustInBetweenActs**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.24

Description Custom action matrix for in-between event.

**swFwValidActs**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.25

Description Matrix of valid acts for a classArea.

**swFwActLevel**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.26

Description swFwActLevel is used to point to the current level for classArea values. It is either default or custom.

Note For a read operation, the return value is either 2 (swFwDefault) or 3 (swFwCustom). The value 1 (swFwReserved) is obsolete.

If the write operation sets the variable to 2 (swFwDefault), the following default action matrix variables are used for the Fabric Watch classArea combination:

— swFwDefaultChangedActs

- swFwDefaultExceededActs
- swFwDefaultBelowActs
- swFwDefaultAboveActs
- swFwDefaultInBetweenActs

If the write operation sets the variable to 3 (swFwCustom), the following custom action matrix variables are used for the Fabric Watch classArea combination:

- swFwCustChangedActs
- swFwCustExceededActs
- swFwCustBelowActs
- swFwCustAboveActs
- swFwCustInBetweenActs

**swFwThresholdTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3

Description The table of individual thresholds.

**swFwThresholdEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1

Description An entry of an individual threshold.

Index swFwClassAreaIndex, swFwThresholdIndex

**swFwThresholdIndex**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.1

Description Represents the element index of a threshold.

Note For environment class, the indexes are from 2 through (number of environment sensors+1).  
For example, the indexes for environment class temperature area are:

- envTemp001: index of 2
- envTemp002: index of 3
- envTemp003: index of 4
- envTemp004: index of 5
- envTemp005: index of 6

For port-related classes such as E\_Port, the indexes are from 1 through (number of ports). For example, the indexes for E\_Port classlink loss area:

- eportLink000: index of 1
- eportLink001: index of 2
- eportLink002: index of 3
- eportLink003: index of 4
- eportLink004: index of 5

- eportLink005: index of 6
- eportLink006: index of 7
- eportLink007: index of 8
- eportLink008: index of 9
- eportLink009: index of 10
- eportLink010: index of 11
- eportLink011: index of 12
- eportLink012: index of 13
- eportLink013: index of 14
- eportLink014: index of 15
- eportLink015: index of 16

**swFwStatus**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.2

Description Indicates whether a threshold is enabled or disabled.

**swFwName**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.3

Description Name of the threshold.

For examples, see [Table 11](#).

**Table 11: swFwName Objects and Object Types**

| swFwName Objects<br>(swFwName) | Object Types (Threshold<br>Names) |
|--------------------------------|-----------------------------------|
| envFan001                      | Env Fan 1                         |
| envPS002                       | Env Power Supply 2                |
| envTemp001                     | Env Temperature 1                 |
| gbicTemp001                    | GBIC Temperature 1                |
| gbicRXP001                     | GBIC RX power 1                   |
| gbicTXP001                     | GBIC TX power 1                   |
| gbicCrnt001                    | GBIC Current 1                    |
| eportCRCs007                   | E Port Invalid CRCs 7             |
| eportLink007                   | E Port Link Failures 7            |
| eportProtoErr007               | E Port Protocol Errors 7          |
| eportRXPerf007                 | E Port RX Performance 7           |
| eportSignal007                 | E Port Loss of Signal 7           |
| eportState007                  | E Port State Changes 7            |
| eportSync007                   | E Port Loss of Sync 7             |
| eportTXPerf007                 | E Port TX Performance 7           |
| eportWords007                  | E Port Invalid Words 7            |

**Table 11: swFwName Objects and Object Types (Continued)**

| swFwName Objects<br>(swFwName)     | Object Types (Threshold<br>Names) (Continued) |
|------------------------------------|---|
| fabricDI000                        | Fabric Domain ID                              |
| fabricED000                        | Fabric E-port down                            |
| fabricFL000                        | Fabric Fabric login                           |
| fabricFQ000                        | Fabric Fabric<->QL                            |
| fabricFR000                        | Fabric Reconfigure                            |
| fabricGS000                        | Fabric GBIC change 0                          |
| fabricSC000                        | Fabric Segmentation                           |
| fabricZC000                        | Fabric Zoning change                          |
| fcuportCRCs013                     | FCU Port Invalid CRCs 13                      |
| fcuportLink013                     | FCU Port Link Failures 13                     |
| fcuportProtoErr0                   | FCU Port Protocol Errors 13                   |
| fcuportRXPerf013                   | FCU Port RX Performance 13                    |
| fcuportSignal013                   | FCU Port Loss of Signal 13                    |
| fcuportState013                    | FCU Port State Changes 13                     |
| fcuportSync013                     | FCU Port Loss of Sync 13                      |
| fcuportTXPerf013                   | FCU Port TX Performance 13                    |
| fcuportWords013                    | FCU Port Invalid Words 13                     |
| portCRCs000 Port<br>Invalid CRCs 0 | Port Invalid CRCs 0                           |
| portLink000                        | Port Link Failures 0                          |
| portProtoErr000                    | Port Protocol Errors 0                        |
| portRXPerf000                      | Port RX Performance 0                         |
| portSignal000                      | Port Loss of Signal 0                         |
| portState000                       | Port State Changes 0                          |
| portSync000                        | Port Loss of Sync 0                           |
| portTXPerf000                      | Port TX Performance 0                         |
| portWords000                       | Port Invalid Words 0                          |
| fopportCRCs013                     | FOP Port Invalid CRCs 13                      |
| fopportLink013                     | FOP Port Link Failures 13                     |
| fopportProtoErr0                   | FOP Port Protocol Errors 13                   |
| fopportRXPerf013                   | FOP Port RX Performance 13                    |
| fopportSignal013                   | FOP Port Loss of Signal 13                    |
| fopportState013                    | FOP Port State Changes 13                     |
| fopportSync013                     | FOP Port Loss of Sync 13                      |
| fopportTXPerf013                   | FOP Port TX Performance 13                    |
| fopportWords013                    | FOP Port Invalid Words 13                     |



**swFwLabel**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.4

Description Label of the threshold.

Note See “[swFwName](#)” on page 183.

**swFwCurVal**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.5

Description Current counter of the threshold.

**swFwLastEvent**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.6

Description Last event type of the threshold.

**swFwLastEventVal**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.7

Description Last event value of the threshold.

**swFwLastEventTime**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.8

Description Last event time of the threshold.

Note This value is in the same format as in `swCurrentDate`.

**swFwLastState**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.9

Description Last event state of the threshold.

**swFwBehaviorType**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.10

Description A behavior of which the thresholds generate event.

**swFwBehaviorInt**

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.11

Description An integer of which the thresholds generate continuous event.

## End Device Group

**swEndDeviceRlsTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1

Description The table of RLS for individual end devices.

Note By default, no data appears in this table.

**swEndDeviceRlsEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1  |
| Description | An entry of an individual end devices' RLS.  |
| Index       | swEndDevicePort, swEndDeviceAlpa   |
| Note        | Since HP StorageWorks switches start with port # 0, the SNMP port # should be physical port # plus 1. In turn, that means that SNMP port # 3 translates to port # 2. |

**swEndDevicePort**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.1   |
| Description | This object represents the port of the local switch to which the end device is connected. |

**swEndDeviceAlpa**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.2  |
| Description | This object represents the AL_PA of the end device. SNMP AL_PA number should be the logical AL_PA number plus 1. For example, SNMP AL_PA number 0xf0 translates to 0xef. |

**swEndDevicePortID**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.3               |
| Description | The Fibre Channel port address ID of the entry. |

**swEndDeviceLinkFailure**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.4      |
| Description | Link failure count for the end device. |

**swEndDeviceSyncLoss**

|             |                                     |
|-------------|-------------------------------------|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.5   |
| Description | Sync loss count for the end device. |

**swEndDeviceSigLoss**

|             |                                    |
|-------------|------------------------------------|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.6  |
| Description | Sig loss count for the end device. |

**swEndDeviceProtoErr**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.7      |
| Description | Protocol err count for the end device. |

**swEndDeviceInvalidWord**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.8      |
| Description | Invalid word count for the end device. |

**swEndDeviceInvalidCRC**

|             |                                       |
|-------------|---------------------------------------|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.9     |
| Description | Invalid CRC count for the end device. |

## All Groups

**swGroupTable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.22.1  |
| Description | The table of groups. This might not be available on all versions of Fabric OS. |

**swGroupEntry**

|             |                                 |
|-------------|---------------------------------|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.22.1.1 |
| Description | An entry of table of groups.    |
| Index       | swGroupIndex                    |

**swGroupIndex**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.22.1.1.1                |
| Description | This object is the group index, starting from 1. |

**swGroupName**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.22.1.1.2             |
| Description | This object identifies the name of the group. |

**swGroupType**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.22.1.1.3             |
| Description | This object identifies the type of the group. |

**swGroupMemTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.22.2   |
| Description | The table of members of all groups. This might not be available on all versions of the Fabric OS. |

**swGroupMemEntry**

|             |                                   |
|-------------|-----------------------------------|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.22.2.1   |
| Description | An entry for a member of a group. |
| Index       | swGroupID, swGroupMemWwn          |

**swGroupID**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.1.1.22.2.1.1                         |
| Description | This object identifies the Group ID of the member switch. |

**swGroupMemWwn**

OID 1.3.6.1.4.1.1588.2.1.1.1.22.2.1.2  
Description This object identifies the WWN of the member switch.

**swGroupMemPos**

OID 1.3.6.1.4.1.1588.2.1.1.1.22.2.1.3  
Description This object identifies the position of the member switch in the group, based on the order that the switches were added in the group.

## ASIC Performance Monitoring Group

**swBlmPerfALPAMntTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1  
Description AL\_PA monitoring counter table.

**swBlmPerfALPAMntEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1.1  
Description AL\_PA monitoring counter for given AL\_PA.  
Index swEndDevicePort, swEndDeviceAlpa

**swBlmPerfAlpaPort**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1.1.1  
Description This object identifies the port index of the switch.

**swBlmPerfAlpaIndx**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1.1.2  
Description This object identifies the AL\_PA index. There can be 126 AL\_PA values.

**swBlmPerfAlpa**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1.1.3  
Description This object identifies the AL\_PA values. These values range between x'01' and x'EF' (1 to 239). AL\_PA value x'00' is reserved for FL\_Port. If Alpha device is invalid, then it will have -1 value.

**swBlmPerfAlpaCRCCnt**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1.1.4  
Description Get CRC count for given AL\_PA and port. This monitoring provides information on the number of CRC errors that occurred on the frames destined to each possible AL\_PA attached to a specific port.

**swBlmPerfEEMntTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2

Description End-to-end monitoring counter table.

**swBlmPerfEEMntEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1

Description End-to-end monitoring counter for given port.

Index swBlmPerfEEPort, swBlmPerfEERefKey

**swBlmPerfEEPort**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.1

Description This object identifies the port number of the switch.

**swBlmPerfEERefKey**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.2

Description This object identifies the reference number of the counter. This reference is a number assigned when a filter is created. In the SNMP Index, start with one instead of 0, add one to the actual reference key.

**swBlmPerfEECRC**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.3

Description End-to-end CRC error for the frames that matched the source identifier-domain identifier (SID-DID) pair.

**swBlmPerfEEFCWRx**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.4

Description Get end-to-end count of Fibre Channel words (FCW) received by the port that matched the SID-DID pair.

**swBlmPerfEEFCWTx**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.5

Description Get end-to-end count of Fibre Channel words (FCW) transmitted by the port that matched the SID-DID pair.

**swBlmPerfEESid**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.6

Description Gets SID information by reference number. SID is a 3-byte field in the frame header used to indicate the address identifier of the N\_Port from which the frame was sent.

**swBlmPerfEEDid**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.7

Description Gets DID information by reference number.

**swBlmPerfFltMntTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3  
Description Filter-based monitoring counter.

**swBlmPerfFltMntEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3.1  
Description Filter-based monitoring counter for given port.  
Index swBlmPerfFltPort, swBlmPerfFltRefkey

**swBlmPerfFltPort**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3.1.1  
Description This object identifies the port number of the switch.

**swBlmPerfFltRefkey**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3.1.2  
Description This object identifies the reference number of the filter. This reference number is assigned when a filter is created. In the SNMP Index, start with one instead of 0, add one to actual reference key.

**swBlmPerfFltCnt**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3.1.3  
Description Get statistics of filter-based monitor. Filter-based monitoring provides information about a filter hit count, such as:

- Read command
- SCSI or IP traffic
- SCSI Read/Write

**swBlmPerfFltAlias**

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3.1.4  
Description Alias name for the filter.

## Trunking Group

**swSwitchTrunkable**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.1  
Description Whether the switch supports the trunking feature or not: no (0) or yes (8).

**swTrunkTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2  
Description Displays trunking information for the switch.

**swTrunkEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2.1

Description Entry for the trunking table.

Index swTrunkPortIndex

**swTrunkPortIndex**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2.1.1

Description This object identifies the switch port index.

Note The value of a port index is 1 higher than the port number labeled on the front panel. For example, port index 1 corresponds to port number 0.

**swTrunkGroupNumber**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2.1.2

Description This object is a logical entity that specifies the group number to which the port belongs. If this value is 0, the port is not trunked.

**swTrunkMaster**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2.1.3

Description Port number that is the trunk master of the group. The trunk master implicitly defines the group. All ports with the same master are considered to be part of the same group.

**swPortTrunked**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2.1.4

Description The current state of trunking for a member port: disabled (0) or enabled (1).

**swTrunkGrpTable**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.3

Description Displays trunking performance information for the switch.

**swTrunkGrpEntry**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.3.1

Description Entry for the trunking group table.

Index swTrunkGrpNumber

**swTrunkGrpNumber**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.3.1.1

Description This object is a logical entity that specifies the group number to which the port belongs.

**swTrunkGrpMaster**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.3.1.2

Description This object gives the master port ID for the trunk group.

**swTrunkGrpTx**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.3.1.3

Description This object gives the aggregate value of the transmitted words from this TrunkGroup.

**swTrunkGrpRx**

OID 1.3.6.1.4.1.1588.2.1.1.1.24.3.1.4

Description This object gives the aggregate value of the words received by this TrunkGroup.



# High-Availability MIB Objects

## 6

This chapter provides descriptions and other information specific to High-Availability MIB object types and discusses the following major topics:

- [Overview](#), page 194
- [High-Availability Group](#), page 196
- [HA-MIB Traps](#), page 200

## Overview

The HA-MIB provides information about the High Availability features of Fabric OS v4.x. This MIB is supported only in Fabric OS v4.1.0 and above (and is not supported in Fabric OS v3.x or Fabric OS v2.6.1).

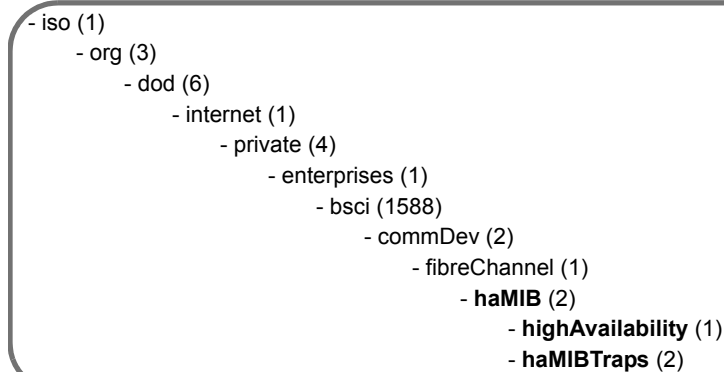
The HA-MIB depends on the SW-MIB. This dependency requires a management application to load the SNMP-FRAMEWORK MIB, then the SW-MIB, and finally the Entity MIB before it can load the HA-MIB.

The descriptions of each of the MIB variables in this chapter come directly from the HA-MIB itself.

The object types in HA-MIB are organized into the following groupings:

- High-Availability Group
- HA-MIB Traps

[Figure 25](#) and [Figure 26](#) depict the organization and structure of the HA-MIB file system.



```
- iso (1)
  - org (3)
    - dod (6)
      - internet (1)
        - private (4)
          - enterprises (1)
            - bsci (1588)
              - commDev (2)
                - fibreChannel (1)
                  - haMIB (2)
                    - highAvailability (1)
                    - haMIBTraps (2)
```

The diagram illustrates the hierarchical structure of the HA-MIB file system. It is a tree starting with 'iso (1)', which branches into 'org (3)'. 'org (3)' branches into 'dod (6)', which branches into 'internet (1)'. 'internet (1)' branches into 'private (4)', which branches into 'enterprises (1)'. 'enterprises (1)' branches into 'bsci (1588)', which branches into 'commDev (2)'. 'commDev (2)' branches into 'fibreChannel (1)', which branches into 'haMIB (2)'. Finally, 'haMIB (2)' branches into 'highAvailability (1)' and 'haMIBTraps (2)'.

**Figure 25: HA-MIB Overall Tree Structure**

```

- haMIB (1.3.6.1.4.1.1588.2.1.2)
  - highAvailability (1)
    • haStatus (1)
    □ fruTable (5)
      ☒ fruEntry (1)
        • fruClass (1)
        • fruStatus (2)
        • fruObjectNum (3)
      □ fruHistoryTable (6)
        ☒ fruHistoryEntry (1)
          • fruHistoryIndex (1)
          • fruHistoryClass (2)
          • fruHistoryObjectNum (3)
          • fruHistoryEvent (4)
          • fruHistoryTime (5)
          • fruHistoryPartNum (6)
          • fruHistorySerialNum (7)
      □ cpTable (7)
        ☒ cpEntry (1)
          • cpStatus (1)
          • cplpAddress (2)
          • cplpMask (3)
          • cplpGateway (4)
          • cpLastEvent (5)
  - haMIBTraps (2)
    - haMIBTrapPrefix (0)
      • fruStatusChanged (1)
      • cpStatusChanged (2)
      • fruHistoryTrap (3)

```

**Figure 26: Tree Structure for highAvailability and haMIBTraps Groups**

Table 12 lists the objects or definitions that are imported into the HA-MIB and the modules from which they are imported.

**Table 12: Objects Imported Into the HA-MIB**

| Object            | Imported from Module |
|-------------------|----------------------|
| MODULE-IDENTITY   | SNMPv2-SMI           |
| OBJECT-TYPE       |                      |
| NOTIFICATION-TYPE |                      |
| TimeTicks         |                      |
| Integer32         |                      |
| IpAddress         |                      |
| mib-2             |                      |
| fibrechannel      | SW-MIB               |
| entPhysicalIndex  | ENTITY-MIB           |
| entPhysicalName   |                      |
| DisplayString     | SNMPv2-TC            |
| TimeStamp         |                      |

## High-Availability Group

This section describes the MIB objects in the High-Availability group.

### haStatus

OID 1.3.6.1.4.1.1588.2.1.2.1.1

Description Indicates whether the system is redundant. Possible values are:

- redundant (0)
- nonredundant (1)

Note Redundant = Dual CP with standby CP ready to take over.  
Non-redundant = Single or Dual CP system with standby CP not available to take over.

## FRU Table

### fruTable

OID 1.3.6.1.4.1.1588.2.1.2.1.5

Description This table inventories the field replaceable unit (FRU) slots available. This table contains an entry for each entry in the entPhysicalTable that has entPhysicalClass set to Container (5) and has a child entry having entPhysicalIsFRU set to true (1).

**fruEntry**

|             |                                       |
|-------------|---------------------------------------|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.5.1          |
| Description | An entry for FRU slot in the fruTable |
| Index       | entPhysicalIndex                      |

**fruClass**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.5.1.1   |
| Description | The type of the FRU object that this slot can hold. Possible values are: <ul style="list-style-type: none"><li>— other (1)</li><li>— unknown (2)</li><li>— chassis (3)</li><li>— cp (4)</li><li>— other-CP (5)</li><li>— switchblade (6)</li><li>— wwn (7)</li><li>— powerSupply (8)</li><li>— fan (9)</li></ul> |

**fruStatus**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.5.1.2   |
| Description | The current status of the FRU object in the slot. Possible values are: <ul style="list-style-type: none"><li>— other (1)</li><li>— unknown (2)</li><li>— on (3)</li><li>— off (4)</li><li>— faulty (5)</li></ul> |

**fruObjectNum**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.5.1.3   |
| Description | The slot number of the blade, and the unit number for everything else. |

## FRU History Table

**fruHistoryTable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.6   |
| Description | This table gives the contents of the entire history log of the FRU events. |

**fruHistoryEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.6.1                              |
| Description | An entry in this table represents a particular FRU event. |
| Index       | fruHistoryIndex   |

**fruHistoryIndex**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.6.1.1               |
| Description | Index of the FRU event in the history table. |

**fruHistoryClass**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.6.1.2   |
| Description | The type of the FRU object related to the event: <ul style="list-style-type: none"><li>— other (1)</li><li>— unknown (2)</li><li>— chassis (3)</li><li>— cp (4)</li><li>— other-CP (5)</li><li>— switchblade (6)</li><li>— wwn (7)</li><li>— powerSupply (8)</li><li>— fan (9)</li></ul> |

**fruHistoryObjectNum**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.6.1.3  |
| Description | The slot number of the blade and the unit number for everything else. |

**fruHistoryEvent**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.6.1.4   |
| Description | The type of the FRU event: <ul style="list-style-type: none"><li>— added (1)</li><li>— removed (2)</li><li>— invalid (3)</li></ul> |

**fruHistoryTime**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.6.1.5         |
| Description | The time at which this event happened. |

**fruHistoryPartNum**

|             |                                    |
|-------------|------------------------------------|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.6.1.6     |
| Description | The part number of the FRU object. |

**fruHistorySerialNum**

|             |                                      |
|-------------|--------------------------------------|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.6.1.7       |
| Description | The serial number of the FRU object. |

## Control Processor (CP) Table

**cpTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.7                  |
| Description | This table lists all the CPs in the system. |

**cpEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.7.1                   |
| Description | An entry represents a single CP in the system. |
| Index       | entPhysicalIndex                               |

**cpStatus**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.7.1.1  |
| Description | The current status of the CP: <ul style="list-style-type: none"><li>— other (1)</li><li>— unknown (2)</li><li>— active (3)</li><li>— standby (4)</li><li>— failed (5)</li></ul> |

**cpIpAddress**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.7.1.2                       |
| Description | The IP address of the Ethernet interface of this CP. |

**cpIpMask**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.7.1.3                    |
| Description | The IP mask of the Ethernet interface of this CP. |

**cpIpGateway**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.7.1.4                |
| Description | The IP address of the IP gateway for this CP. |

**cpLastEvent**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.2.1.7.1.5  |
| Description | The last event related to this CP: <ul style="list-style-type: none"><li>— haSync (1)</li><li>— haOutSync (2)</li><li>— cpFaulty (3)</li><li>— cpHealthy (4)</li><li>— configChange (5)</li><li>— failOverStart (6)</li><li>— failOverDone (7)</li><li>— firmwareCommit (8)</li><li>— firmwareUpgrade (9)</li><li>— other (10)</li><li>— unknown (11)</li></ul> |
| Note        | haSync = HA state on both is in sync; haOutSync = HA state on both is out of sync.  |

## HA-MIB Traps

This section lists the HA-MIB traps.

**fruStatusChanged**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.2.0.1                                 |
| Objects     | entPhysicalName<br>fruStatus                                 |
| Status      | Current  |
| Description | This trap is sent when the status of any FRU object changes. |

**cpStatusChanged**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.4.1.1588.2.1.2.2.0.2   |
| Objects     | cpStatus<br>cpLastEvent<br>swID<br>swSsn   |
| Status      | Current  |
| Description | This trap is sent when the status of any CP object changes.                      |
| Note        | The cpLastEvent variable provides the information about the event that occurred. |



**fruHistoryTrap**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.4.1.1588.2.1.2.2.0.3  |
| Objects     | fruHistoryClass<br>fruHistoryObjectNum<br>fruHistoryEvent<br>fruHistoryTime<br>fruHistoryPartNum<br>fruHistorySerialNum |
| Status      | Current   |
| Description | This trap is sent when an FRU is added or removed.  |



# FibreAlliance MIB Objects

## 7

This chapter contains descriptions and other information specific to FibreAlliance MIB (FCMGMT-MIB) object types and discusses the following major topics:

- [Overview](#), page 204
- [Connectivity Group](#), page 209
- [Statistics Group](#), page 236
- [Service Group](#), page 245
- [SNMP Trap Registration Group](#), page 247
- [Revision Number Scalar](#), page 249
- [Unsupported Tables](#), page 250
- [Related Traps](#), page 250

## Overview

The descriptions of each of the MIB variables in this chapter come directly from the FCMGMT-MIB itself. The object types in FCMGMT-MIB are organized into the following groups:

- Connectivity
- Trap Registration
- Revision Number
- Statistic Set
- Service Set

## FCMGMT-MIB System Organization of MIB Objects

Figure 27 through Figure 29 depict the organization and structure of FCMGMT-MIB.

```

- iso (1)
  - org (3)
    - dod (6)
      - internet (1)
        - experimental (3)
          - fcmgmt (94)
            - connSet (1)
              • uNumber (1)
              • systemURL (2)
              □ connUnitTable (6)
              □ connUnitRevsTable (7)
              □ connUnitSensorTable (8)
              □ connUnitPortTable (10)
              □ connUnitEventTable (11)
              □ connUnitLinkTable (12)
            - trapReg (2)
              • trapMaxClients (1)
              • trapClientCount (2)
              □ trapRegTable (3)
              • revisionNumber (3)
            - statSet (4)
              □ connUnitPortStatTable (5)
            - connUnitServiceSet (5)
              - connUnitServiceScalars (1)
                • connUnitSnsMaxEntry (1)
              - connUnitServiceTables (2)
                □ connUnitSnsTable (1)

```

Figure 27: FCMGMT-MIB Overall Tree Structure

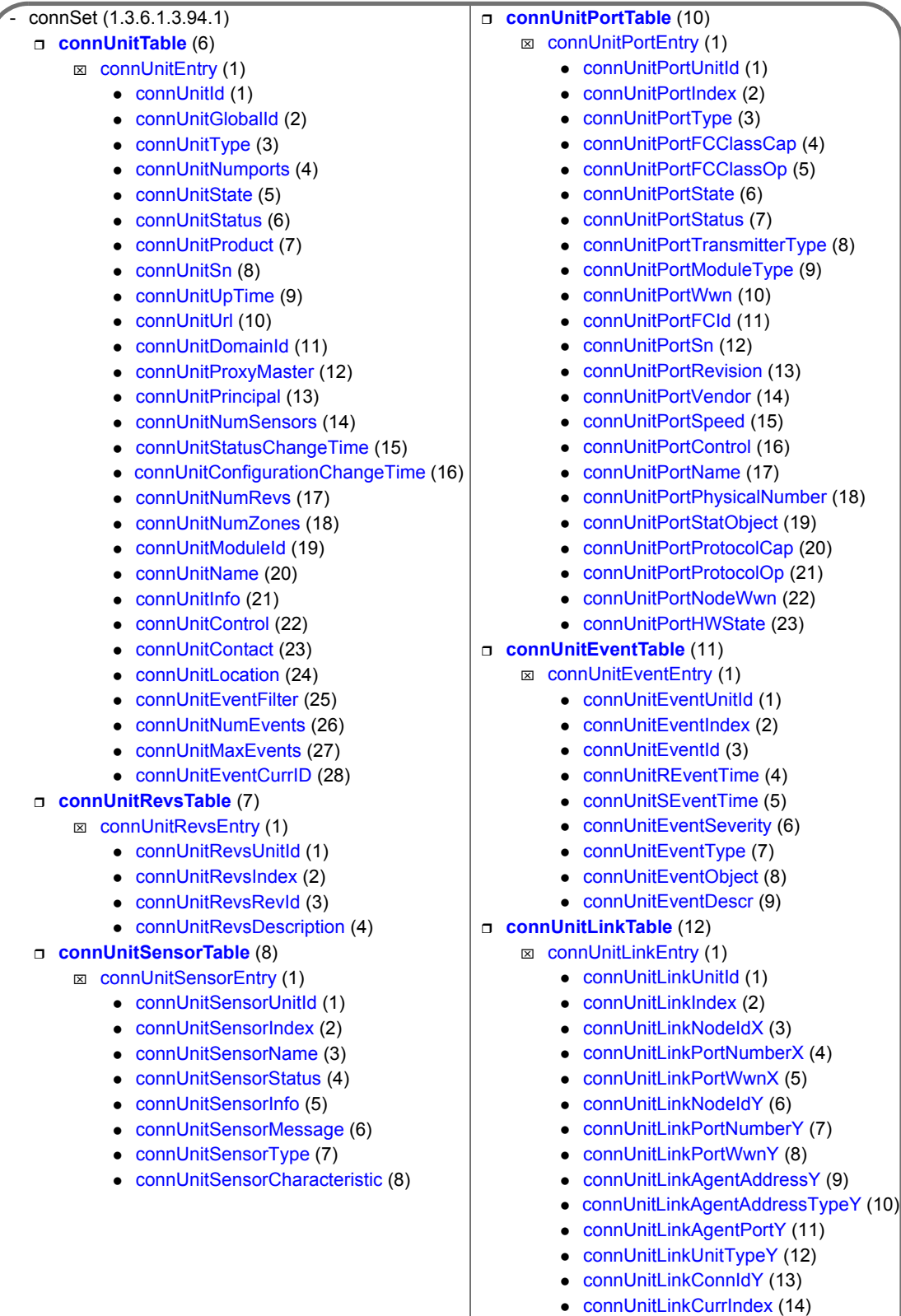


Figure 28: Tree Structure for connSet Tables

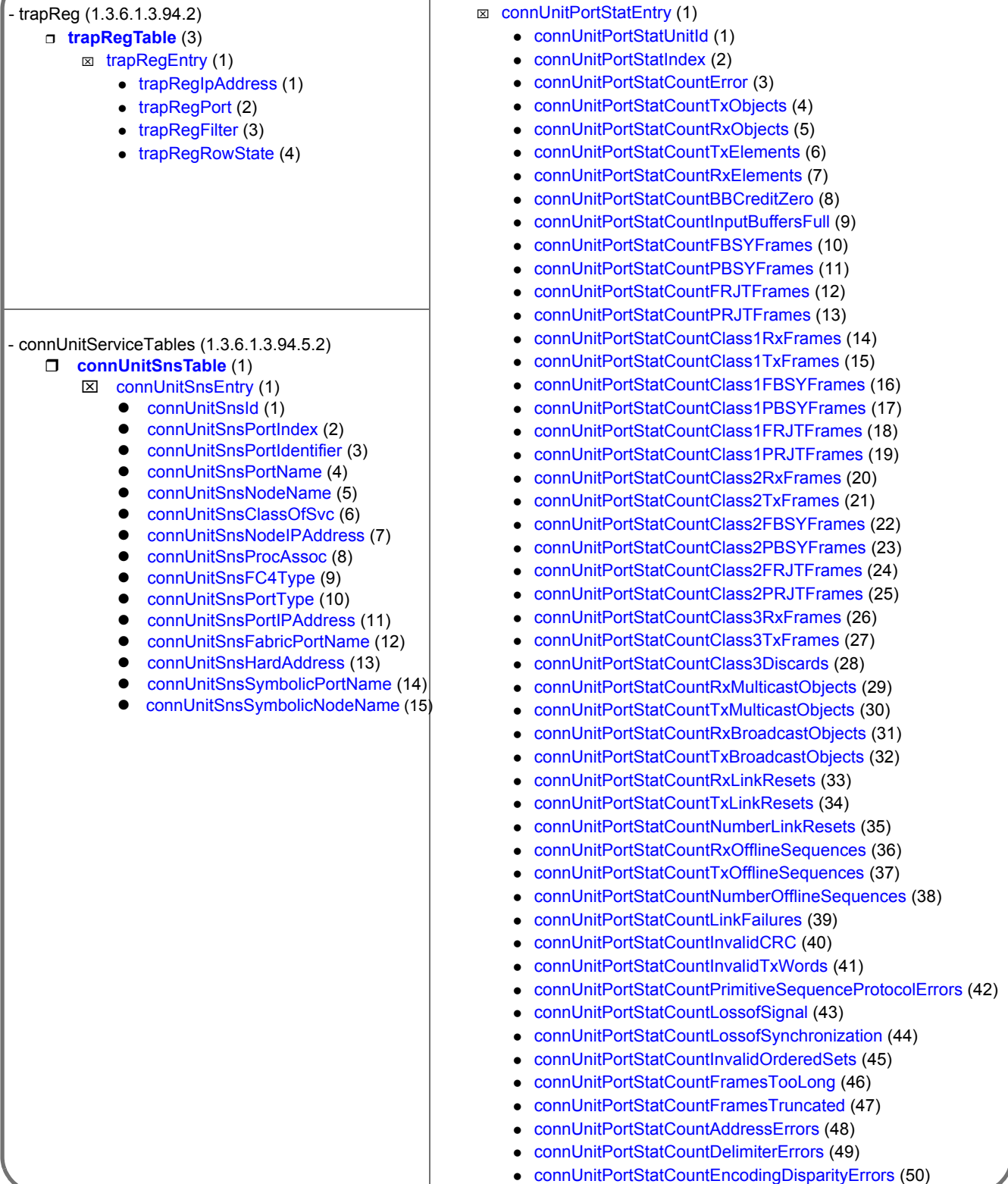


Figure 29: Tree Structure for trapReg, connUnitSns, and connUnitPortStat Tables

## Definitions for FCMGMT-MIB

The definitions in [Table 13](#) are used for FCMGMT-MIB.

**Table 13: FCMGMT-MIB Definitions**

| Type Definition | Value                   | Description  |
|-----------------|-------------------------|--|
| FcNameId        | Octet String of size 8  |  |
| FcGlobalId      | Octet String of size 16 |  |
| FcAddressId     | Octet String of size 3  |  |
| FcEventSeverity | Integer                 | 1 (unknown)<br>2 (emergency)Emergency status.<br>3 (alert)Alert status.<br>4 (critical)Critical status.<br>5 (error)Error status.<br>6 (warning)Warning status.<br>7 (notify)Notification status.<br>8 (info)Informational status.<br>9 (debug)Debug status.<br>10 (mark)All messages logged.  |
| FcUnitType      | Integer                 | 1 (unknown)<br>2 (other)None of 3–14.<br>3 (hub)Passive connectivity unit supporting loop protocol.<br>4 (switch)Active connectivity unit supporting multiple protocols.<br>5 (gateway)Unit that not only converts the interface but also encapsulates the frame into another protocol. The assumption is that there are always two gateways connected together: for example, FC <-> ATM.<br>6 (converter)Unit that converts from one interface to another: for example, FC <-> SCSI.<br>7 (hba)Host bus adapter.<br>8 (proxy-agent)Software proxy agent.<br>9 (storage-device)Disk, CD, tape, and so on.<br>10 (host)Host computer.<br>11 (storage-subsystem)For example, RAID, library.<br>12 (module)Subcomponent of a system.<br>13 (swdriver)Software driver.<br>14 (storage-access-device) Provides storage management and access for heterogeneous hosts and heterogeneous devices. |



## Connectivity Group

Implementation of the Connectivity group is mandatory for all systems.

### uNumber

OID 1.3.6.1.3.94.1.1

Description The number of connectivity units present on this system (represented by this agent). The uNumber can be a count of the boards in a chassis or the number of full boxes in a rack.

Note The connectivity unit is mapped to a switch. The uNumber is always set to 1.

### systemURL

OID 1.3.6.1.3.94.1.2

Description The top-level URL of the system; if it does not exist, the value is an empty string. The URL format is implementation dependant and can have keywords embedded that are preceded by a percent sign (for example, %USER).

The following are the defined keywords that are recognized and replaced with data during a launch:

|          |                            |
|----------|----------------------------|
| USER     | Replace with username      |
| PASSWORD | Replace with password      |
| GLOBALID | Replace with global ID     |
| SERIALNO | Replace with serial number |

Note The expected value for system URL.0 is:

http://{a.b.c.d}

where {a.b.c.d} is the IP address of the switch if a Web Tools license is available.

"" (null)

where "" is used when a Web Tools license is not available.

## Connectivity Unit Table

### connUnitTable

OID 1.3.6.1.3.94.1.6

Description A list of units under a single SNMP agent. The number of entries is given by the value of uNumber. The value is 1 for stand-alone system.

### connUnitEntry

OID 1.3.6.1.3.94.1.6.1

Description A connectivity unit entry containing objects for a particular unit.

Index connUnitId

**connUnitId**

OID 1.3.6.1.3.94.1.6.1.1

Description The unique identification for this connectivity unit among those within this proxy domain. The value must be unique within the proxy domain because it is the index variable for connUnitTable. The value assigned to a given connectivity unit should be persistent across agent and unit resets. It should be the same as connUnitGlobalId if connUnitGlobalId is known and stable.

Note The implementation maps the switch WWN to the top eight octets of this variable and sets the remaining lower eight octets to 0.  
To specify a particular instance of any columnar variable in the connUnitEntry (such as connUnitType), specify the instance identifier as a 16-octet value.

Example:

connUnitType.10.0.0.60.69.4.11.19.0.0.0.0.0.0.0

where the object instance identifier consists of 16 octets, each representing the byte value from high-byte order to low-byte order of this 128-bit integer.

**connUnitGlobalId**

OID 1.3.6.1.3.94.1.6.1.2

Description An optional global-scope identifier for this connectivity unit. It must be a WWN for this connectivity unit or 16 octets of value 0.

The following characteristics are required:

- WWN formats requiring fewer than 16 octets must be extended to 16 octets with trailing 0 octets.
- If a WWN is used for connUnitId, the same WWN must be used for connUnitGlobalId.

When a non-zero value is provided, the following characteristics are strongly recommended:

- It should be persistent across agent and unit resets.
- It should be globally unique.
- It should be one of these FC-PH/PH3 formats:
  - IEEE (NAA=1)
  - IEEE Extended (NAA=2)
  - IEEE Registered (NAA=5)
  - IEEE Registered extended (NAA=6)

Use of the IEEE formats allows any IEEE-registered vendor to assure global uniqueness independently. The following are some references on IEEE WWN formats:

<http://standards.ieee.org/regauth/oui/tutorials/fibreformat.html>

[http://standards.ieee.org/regauth/oui/tutorials/fibrecomp\\_id.html](http://standards.ieee.org/regauth/oui/tutorials/fibrecomp_id.html)

If one or more WWNs are associated with the connUnit via other management methods, one of them should be used for connUnitGlobalId.

If a WWN is not assigned specifically to the connUnit, there is some merit to using a WWN assigned to one of its permanently attached FC/LAN interfaces. This cannot risk uniqueness, though.

As a counterexample, if your agent runs in a host and the host has an HBA, it is quite possible that agent, host, and HBA are all distinct connUnits, so the host and agent cannot use the WWN of the HBA.

**Example:**

If your hub has a built-in Ethernet port, it might be reasonable for the hub to use its LAN address (prefixed with the appropriate NAA) as its connUnitId. But if the Ethernet is a replaceable PCCard, the hub should have an independent ID.

Note The implementation maps the switch WWN to the top eight octets of this variable and sets the remaining lower 8 octets to 0.

**Example:**

If the switch WWN is 10:0:0:60:69:10:02:18, then use the SNMP GET command on connUnitGlobalId.10.0.0.60.69.10.02.18.0.0.0.0.0.0.0 returns:

10 00 00 60 69 10 02 18 00 00 00 00 00 00 00 00

**connUnitType**

OID 1.3.6.1.3.94.1.6.1.3

Description The type of this connectivity unit.

Note Set to 4 (switch).

**connUnitNumports**

OID 1.3.6.1.3.94.1.6.1.4

Description Number of physical ports (between 0 and the *maximum number of system supported ports*) in the connectivity unit (internal, embedded, external).

Note To determine the maximum number of system supported ports, use the SNMP GET command on swFcPortCapacity.

The Core Switch 2/64 and SAN Director 2/128 support 0 to *maximum number of system supported ports*.

**connUnitState**

OID 1.3.6.1.3.94.1.6.1.5

Description Overall state of the connectivity unit:

- unknown (1)
- online (2) Set the state to online.
- offline (3) Set the state to offline.

Mapped as follows:

- switchState (ONLINE) 2 (online)
- switchState (not ONLINE) 3 (offline, testing, faulty)

**connUnitStatus**

OID 1.3.6.1.3.94.1.6.1.6

Description Overall status of the connectivity unit:

- unknown (1)
- unused (2)
- ok (3)
- warning (4) Needs attention.
- failed (5)

Note switchStatus maps directly as follows:

**connUnitStatusswitchStatus**

|             |                  |
|-------------|------------------|
| 1 (unknown) | Unknown          |
| 2 (unused)  | Unmonitored      |
| 3 (ok)      | Healthy/ok       |
| 4 (warning) | Marginal/Warning |
| 5 (failed)  | Down/Failed      |

**connUnitProduct**

OID 1.3.6.1.3.94.1.6.1.7

Description The connectivity unit vendor's product model name.

Note This is the same as for sysDescr (set for as many as 79 bytes).

**connUnitSn**

OID 1.3.6.1.3.94.1.6.1.8

Description The serial number for this connectivity unit.

Note Set to the SSN (which by default is the WWN); can be changed through Telnet.

**connUnitUpTime**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.6.1.9   |
| Description | The number of centiseconds since the last unit initialization. |
| Note        | Set when connUnitTable is initialized.                         |

**connUnitUrl**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.6.1.10  |
| Description | URL to launch a management application, if applicable; otherwise, an empty string. In a standalone unit, this would be the same as the top-level URL. This has the same definition as systemURL for keywords.  |
| Note        | (Same as systemURL.) The expected value for connUnitURL.0 is:<br><div style="margin-left: 40px;">http://{a.b.c.d}</div> <div style="margin-left: 40px;">where {a.b.c.d} is the IP address of the switch if Web Tools license is available.</div> <div style="margin-left: 40px;">"" (null)</div> <div style="margin-left: 40px;">where "" is the IP address of the switch if Web Tools license is not available.</div> |

**connUnitDomainId**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.6.1.11   |
| Description | The 24-bit Fibre Channel address ID of this connectivity unit, right-justified with leading zeros if required. If this value is not applicable, return all bits to 1. |
| Note        | Set to the switch domain ID (per FC-SW).  |

**connUnitProxyMaster**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.6.1.12   |
| Description | A value of yes means this is the proxy master unit for a set of managed units. Possible values are:<br><div style="margin-left: 40px;">— unknown (1)</div> <div style="margin-left: 40px;">— no (2)</div> <div style="margin-left: 40px;">— yes (3)</div> |
|             | <b>Example:</b><br><div style="margin-left: 40px;">This could be the only unit in a set of units that has a management card in it. A standalone unit should return yes for this object.</div>   |
| Note        | Set to 3 (yes).   |

**connUnitPrincipal**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.6.1.13  |
| Description | Indicates whether this connectivity unit is the principal unit within the group of fabric elements. If this value is not applicable, it returns unknown.<br>Possible values are:<br>— unknown (1)<br>— no (2)<br>— yes (3) |
| Note        | If the switch is principal, this is set to 3 (yes); otherwise, it is set to 2 (no).  |

**connUnitNumSensors**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.6.1.14  |
| Description | Number of sensors (between 0 and <i>maximum number of sensors</i> ) in the connUnitSensorTable.  |
| Note        | Core Switch 2/64 and SAN Director 2/128: This value is between 0 and 62. (The configurations for this switch vary too greatly to list them for each specific type of sensor.)<br><br>SAN Switch 2/16: This value is between 0 and 13 (temperature = 6, fan = 3, power supply = 4). |

**connUnitStatusChangeTime**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.6.1.15  |
| Description | The sysUpTime time stamp (in centiseconds) at which the last status change occurred for any members of the set; this is the latest time stamp that connUnitStatus or connUnitPortStatus changed. |

**connUnitConfigurationChangeTime**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.6.1.16  |
| Description | The sysUpTime time stamp (in centiseconds) at which the last configuration change occurred for any members of the set. In other words, this is the latest time stamp of flash memory update. This represents a union of change information for connUnitConfigurationChangeTime |

**connUnitNumRevs**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.6.1.17                         |
| Description | The number of revisions in connUnitRevsTable. |
| Note        | Set to 2.                                     |

**connUnitNumZones**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.6.1.18                             |
| Description | Number of zones defined in connUnitZoneTable.     |
| Note        | Set to 0 because the zone table is not supported. |

**connUnitModuleId**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.6.1.19  |
| Description | This is a unique ID, persistent between boots, that can be used to group a set of connUnits together into a module. The intended use would be to create a connUnit with a connUnitType of module to represent a physical or logical group of connectivity units. Then the value of the group would be set to the value of connUnitId for this container connUnit.<br><br>connUnitModuleId should be 0s if this connUnit is not part of a module. |
| Note        | Set to the WWN of the switch.  |

**connUnitName**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.6.1.20  |
| Description | A display string containing a name for this connectivity unit. This object value should be persistent between boots. |
| Note        | Set to switchName/sysName.   |

**connUnitInfo**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.6.1.21   |
| Description | A display string containing information about this connectivity unit. This object value should be persistent between boots. |
| Note        | Set to sysDescr and read-only.  |

**connUnitControl**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.6.1.22  |
| Description | Controls the addressed connUnit. Each implementation might choose not to allow any or all of these values on a SET. Possible values are: <ul style="list-style-type: none"> <li>— unknown (1)</li> <li>— invalid (2)</li> <li>— resetConnUnitColdStart (3): Reboot. Performs a switch reboot.</li> <li>— resetConnUnitWarmStart (4): Fastboot. The addressed unit performs a Warm Start reset.</li> <li>— offlineConnUnit (5): Disable switch. The addressed unit puts itself into an implementation-dependant offline state. In general, if a unit is in an offline state, it cannot be used to perform meaningful Fibre Channel work.</li> <li>— onlineConnUnit (6): Enable switch. The addressed unit puts itself into an implementation-dependant online state. In general, if a unit is in an online state, it is capable of performing meaningful Fibre Channel work.</li> </ul> |

Cold start and warm start are as defined in MIB-II and are not meant to be a factory reset.

This is similar to swAdmStatus:

- resetConnunitColdStart = reboot
- resetConnunitWarmStart = fastboot
- offlineConnUnit = disable switch
- onlineConnUnit = enable switch
- default after reboot = unknown

The declaration 1 (unknown) maps to the default value upon rebooting, and 2 (invalid) is not applicable.

Note                Declarations 3 and 4 perform the same operation—a cold boot of the switch.

#### **connUnitContact**

OID                1.3.6.1.3.94.1.6.1.23

Description      Contact information for this connectivity unit.

Note                Displays the same value as sysContact. Changing the value in this variable causes the value in sysContact also to be changed.

#### **connUnitLocation**

OID                1.3.6.1.3.94.1.6.1.24

Description      Location information for this connectivity unit.

Note                Displays the same value as sysLocation.

#### **connUnitEventFilter**

OID                1.3.6.1.3.94.1.6.1.25

Description      Defines the event severity logged by this connectivity unit. All events of severity less than or equal to connUnitEventFilter are logged in connUnitEventTable.

Note                Returns (debug).

#### **connUnitNumEvents**

OID                1.3.6.1.3.94.1.6.1.26

Description      Number of events currently in connUnitEventTable.

Note                Returns the number of events currently in the buffer (between 0 and 2048).

#### **connUnitMaxEvents**

OID                1.3.6.1.3.94.1.6.1.27

Description      Maximum number of events (2048) that can be defined in connUnitEventTable.



**connUnitEventCurrID**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.6.1.28                     |
| Description | The last-used event ID (connUnitEventId). |
| Note        | Maximum is 2147483647 ( $2^{31}-1$ ).     |

**Connectivity Unit Revisions Table****connUnitRevsTable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.7   |
| Description | Table of the revisions supported by connectivity units managed by this agent.  |
| Note        | This table lists the versions of hardware and software elements in the switch. |

**connUnitRevsEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.7.1  |
| Description | Table of the revisions supported by connectivity units managed by this agent. |
| Index       | connUnitRevsUnitId<br>connUnitRevsIndex                                       |

**connUnitRevsUnitId**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.7.1.1  |
| Description | The connUnitId value for the connectivity unit that contains this revision table. |

**connUnitRevsIndex**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.7.1.2   |
| Description | A unique value among all connUnitRevsEntrys with the same value of connUnitRevsUnitId, in the range between 1 and connUnitNumRevs. |
| Note        | Index 1 returns the hardware version. Index 2 returns the software version.  |

**connUnitRevsRevId**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.7.1.3  |
| Description | A vendor-specific string identifying a revision of a component of the connUnit indexed by connUnitRevsUnitId.   |
| Note        | Index 1 returns the switchType from the Telnet command switchShow.<br>Index 2 returns the Fabric OS version from Telnet command version: for example, v2.6. |

**connUnitRevsDescription**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.7.1.4  |
| Description | Description of a component to which the revision corresponds.               |
| Note        | Index 1 returns the hardware version. Index 2 returns the software version. |

## Connectivity Unit Sensor Table

### **connUnitSensorTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.8  |
| Description | Table of the sensors supported by each connectivity unit managed by this agent. |

### **connUnitSensorEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.8.1   |
| Description | Each entry contains the information for a specific sensor. |
| Index       | connUnitSensorUnitId<br>connUnitSensorIndex                |

### **connUnitSensorUnitId**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.8.1.1   |
| Description | The connUnitId value of the connectivity unit that contains this sensor table. |
| Note        | Set to connUnitId.   |

### **connUnitSensorIndex**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.8.1.2   |
| Description | A unique value among all connUnitSensorEntrys with the same value of connUnitSensorUnitId, in the range between 1 and the return value from connUnitNumSensor. |

### **connUnitSensorName**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.8.1.3   |
| Description | A textual identification of the sensor, intended primarily for operator use.                     |
| Note        | Each contains the name of the sensor in textual format: for example, Temp #1, Fan #2, and so on. |

### **connUnitSensorStatus**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.8.1.4   |
| Description | The status indicated by the sensor: <ul style="list-style-type: none"><li>— unknown (1)</li><li>— other (2)</li><li>— ok (3) The sensor indicates okay.</li><li>— warning (4) The sensor indicates a warning.</li><li>— failed (5) The sensor indicates failure.</li></ul> |
| Note        | Nominal = 3 (ok). Not nominal = 5 (failed).  |

**connUnitSensorInfo**

OID 1.3.6.1.3.94.1.8.1.5

Description Miscellaneous static information about the sensor, such as its serial number.

Note Each contains textual information about the sensor.  
Returns the serial ID if this is for the power supply; otherwise, returns Null.

**connUnitSensorMessage**

OID 1.3.6.1.3.94.1.8.1.6

Description This describes the status of the sensor as a message. It might also provide more resolution on the sensor indication; for example, cover temperature 1503K, above nominal operating range.

Note Each contains the sensor status (and reading if applicable) in textual format.

**connUnitSensorType**

OID 1.3.6.1.3.94.1.8.1.7

Description The type of component being monitored by this sensor:

- unknown (1)
- other (2)
- battery (3)
- fan (4)
- power-supply (5)
- transmitter (6)
- enclosure (7)
- board (8)
- receiver (9)

Note The following mapping is for each individual sensor, where applicable:

**swSensorType**

1 (temperature)

2 (fan)

3 (power supply)

**connUnitSensorType**

8 (board)

4 (fan)

5 (power supply)

**connUnitSensorCharacteristic**

OID 1.3.6.1.3.94.1.8.1.8

Description The characteristics being monitored by this sensor. Possible values are:

- unknown (1)
- other (2)
- temperature (3)
- pressure (4)
- emf (5)

- currentValue (6) Current is a keyword.
- airflow (7)
- frequency (8)
- power (9)
- door (10) (Not supported in Fabric OS v2.6.1.)

Note                   The following mapping is for each individual sensor, where applicable:

| <b>swSensorType</b> | <b>connUnitSensorCharacteristic</b> |
|---------------------|-------------------------------------|
| 1 (temperature)     | 3 (temperature)                     |
| 2 (fan)             | 7 (airflow)                         |
| 3 (power supply)    | 9 (power)                           |

## Connectivity Unit Port Table

### **connUnitPortTable**

OID                   1.3.6.1.3.94.1.10  
Description       Generic information on ports for a specific connUnit.

### **connUnitPortEntry**

OID                   1.3.6.1.3.94.1.10.1  
Description       Each entry contains the information for a specific port.  
Index               connUnitPortUnitId  
                     connUnitPortIndex

### **connUnitPortUnitId**

OID                   1.3.6.1.3.94.1.10.1.1  
Description       The connUnitId value of the connectivity unit that contains this port.  
Note               Same value as connUnitId.

### **connUnitPortIndex**

OID                   1.3.6.1.3.94.1.10.1.2  
Description       Number of physical ports between 0 and the maximum number of system supported ports in the connectivity unit (internal, embedded, external).  
Note               To determine the maximum number of system supported ports, use the SNMP GET command on swFcPortCapacity.  
                     The Core Switch 2/64 and SAN Director 2/128 support 0 to maximum number of system supported ports.

### **connUnitPortType**

OID                   1.3.6.1.3.94.1.10.1.3  
Description       The port type:

- unknown (1)
- other (2)
- not-present (3)
- hub-port (4)
- n-port (5) End port for fabric.
- l-port (6) End port for loop.
- fl-port (7) Public loop.
- f-port (8) Fabric port.
- e-port (9) Fabric expansion port.
- g-port (10) Generic fabric port.
- domain-ctl (11) Domain controller.
- hub-controller (12)
- scsi (13) Parallel SCSI port.
- escon (14)
- lan (15)
- wan (16)
- ac (17) AC power line. (Not supported in Fabric OS v2.6.1.)
- dc (18) DC power line. (Not supported in Fabric OS v2.6.1.)
- ssa (19) Serial storage architecture. (Not supported in Fabric OS v2.6.1.)

Note Mapped as:

- U\_Port = 10 (g-port)
- F\_Port = 8 (f-port)
- FL\_Port = 7 (fl-port)
- E\_Port = 9 (e-port)

#### **connUnitPortFCClassCap**

OID 1.3.6.1.3.94.1.10.1.4

Description Bit mask that specifies the classes of service capability of this port. If this is not applicable, return all bits set to 0.

The bits have the following definition:

- unknown0
- class-f1
- class-one2
- class-two4
- class-three8
- class-four16
- class-five32
- class-six64

Note For an F or FL\_Port, this value is 0x000C. For a G or E\_Port, this value is 0x000D.

**connUnitPortFCClassOp**

OID 1.3.6.1.3.94.1.10.1.5

Description Bit mask that specifies the classes of service that are currently operational. If this is not applicable, returns all bits set to 0. This object has the same definition as connUnitPortFCClassCap.

Note For an F or FL\_Port, this value is 0x000C. For a G or E\_Port, this value is 0x000D.

**connUnitPortState**

OID 1.3.6.1.3.94.1.10.1.6

Description The state of the port hardware:

- unavailable (1) Do not use.
- online (2) Available for meaningful work.
- offline (3) Not available for meaningful work.
- bypassed (4) No Map to your testing. Not supported in Fabric OS v2.6.1.

Note For an E, F, or FL\_Port, the value is online. For a U\_Port, the value is offline (disabled, testing, faulted).

**connUnitPortStatus**

OID 1.3.6.1.3.94.1.10.1.7

Description An overall protocol status for the port:

- unknown (1)
- unused (2) Device cannot report this status.
- ready (3) FCAL Loop or FCPH Link reset protocol initialization has completed.
- warning (4) Do not use.
- failure (5) Do not use.
- notparticipating (6) Loop not participating and does not have a loop address.
- initializing (7) Protocol is proceeding.
- bypass (8) Do not use.
- ols (9) FCP offline status. (Not supported in Fabric OS v2.6.1.)

Note For an E, F, or FL\_Port, the value is 3 (ready). For a U\_Port, the value is 2 (unused) if not faulty with GBIC, 4 (warning) if not faulty but no GBIC, or 5 (failure) if faulty.

**connUnitPortTransmitterType**

OID 1.3.6.1.3.94.1.10.1.8

Description The technology of the port transceiver:

- unknown (1)
- other (2)
- unused (3)
- shortwave (4)
- longwave (5)
- copper (6)
- scsi (7)
- longwaveNoOFC (8)
- shortwaveNoOFC (9)
- longwaveLED (10)
- ssa (11)(Not supported in Fabric OS v2.6.1.)

Note For an external FC\_Port, this value should be 9 (shortwaveNoOFC), 8 (longwaveNoOFC), or 6 (copper).

**connUnitPortModuleType**

OID 1.3.6.1.3.94.1.10.1.9

Description The module type of the port connector:

- unknown (1)
- other (2)
- gbic (3)
- embedded (4) Fixed (oneXnine)
- glm (5)
- gbicSerialId (6)
- gbicNoSerialId (7)
- gbicNotInstalled (8)
- smallFormFactor (9)

Note For an external FC\_Port with GBIC, this value is set to 6 (gbicSerialId) or 7 (gbicNoSerialId). For an external FC\_Port without GBIC, this value is set to 8 (gbicNotInstalled).

**connUnitPortWwn**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.10.1.10  |
| Description | The World Wide Name of the port, if applicable; otherwise, an empty string.<br><br>This is in IEEE Extended format, and the extension contains the internal port number of each port.   |
| Note        | The internal port number is 1 less than the port index. For example, if the switch has WWN 10:00:00:60:69:10:02:18, then port numbers 0 and 6 have WWN 20:00:00:60:69:10:02:18 and 20:06:00:60:69:10:02:18, respectively. However, the embedded port has WWN 10:00:00:60:69:10:02:18, the same as the switch. |

**connUnitPortFCId**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.10.1.11   |
| Description | This is the assigned Fibre Channel ID of this port. This value is expected to be a Big Endian value of 24 bits. If this is a loop, it is the AL_PA that is connected. If this is an E_Port, it contains only the domain ID, left justified, 0 filled. If this port does not have a Fibre Channel address, return all bits is set to 1. |
| Note        | For an F_Port, this is the Fibre Channel ID to which the connected N_port is assigned. For an FL_Port, this is the Fibre Channel ID of the FL_Port (alpha = 0). For a U or E_Port, this is similar to F_Port.  |

**connUnitPortSn**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.10.1.12  |
| Description | The serial number of the unit (for example, for a GBIC). If this is not applicable, return an empty string. |
| Note        | If the GBIC has a serial ID, the return value is the GBIC part number; otherwise, the return value is Null. |

**connUnitPortRevision**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.10.1.13  |
| Description | The port revision (for example, a GBIC).  |
| Note        | If the GBIC has a serial ID, this returns the GBIC revision number; otherwise, it returns a Null value. |

**connUnitPortVendor**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.10.1.14  |
| Description | The port vendor (for example, for a GBIC).  |
| Note        | If the GBIC has a serial ID, this returns the GBIC vendor name; otherwise, it returns a Null value. |



**connUnitPortSpeed**

OID 1.3.6.1.3.94.1.10.1.15

Description The speed of the port, in kilobytes per second.

Note The valid values for Core Switch 2/64 and SAN Director 2/128: 125,000 or 250,000

**connUnitPortControl**

OID 1.3.6.1.3.94.1.10.1.16

Description Controls the addressed connUnit's port.

Valid commands are:

- `resetConnUnitPort:`

If the addressed connUnit allows this operation to be performed to this port, the addressed port performs a vendor-specific reset operation. Examples of these operations are

- The Link Reset protocol.
- The Loop Initialization protocol.
- Resynchronization occurring between the transceiver in the addressed port to the transceiver to which the port is connected.

- `bypassConnUnitPort:`

If the addressed connUnit allows this operation to be performed to this port, the addressed port performs a vendor-specific "bypass" operation. Examples of these operations are:

- Transitioning from online to offline.
- A request (NON-PARTICIPATING) command to the loop port state machine.
- Removal of the port from an arbitrated loop by a hub.

- `unbypassConnUnitPort:`

If the addressed connUnit allows this operation to be performed to this port, the addressed port performs a vendor-specific "unbypass" operation. Examples of these operations are

- The Link Failure protocol.
- A request (PARTICIPATING) command to the loop port state machine.
- Addition of the port to an arbitrated loop by a hub.

- `offlineConnUnitPort`:

If the addressed connUnit allows this operation to be performed to this port, the addressed port performs a vendor-specific offline operation. Examples of these operations are

- Disabling a port's transceiver.
- The Link Failure protocol.
- A request (NON-PARTICIPATING) command to the loop port state machine for removal of the port from an arbitrated loop by a hub.

- `onlineConnUnitPort:`

If the addressed connUnit allows this operation to be performed to this port, the addressed port performs a vendor-specific online operation. Examples of these operations are

- Enabling a port's transceiver.
- The Link Failure protocol, request (PARTICIPATING) command to the loop port state machine.
- Addition of the port from an arbitrated loop by a hub.

Each implementation might choose not to allow any or all of these values on a SET.

If the management station uses in-band communication (FC-IP) with the switch, either of the two following actions might result in a loss of in-band communication with the switch:

- Disabling the FC port that is connected to the management station
- Disabling the embedded port

## Note

Return values are:

- `resetConnUnitPortportDisable` (F or E\_Port, loop for U\_Port)
- `bypassConnUnitPort portDisable` (FL\_Port)
- `unbypassConnUnitPort portEnable` (FL\_Port)
- `offlineConnUnitPort portDisable` (E, F, FL\_Port)
- `onlineConnUnitPort portEnable` (U)
- `resetConnUnitPortCounters`, which clears the port statistics counter. When rebooted, this defaults to 1 (unknown).

**connUnitPortName**

OID 1.3.6.1.3.94.1.10.1.17

|             |   |
|-------------|---|
| Description | A string describing the addressed port. |
|-------------|---|

**Note** This object is read-only for HP switches.

**connUnitPortPhysicalNumber**

OID 1.3.6.1.3.94.1.10.1.18

Description This is the internal port number by which this port is known. In many implementations, this should be the same as connUnitPortIndex. Some implementations might have an internal port representation not compatible with the rules for table indices. In these cases, provide the internal representation of this port in this object. This value might also be used in the connUnitLinkPortNumberX or connUnitLinkPortNumberY objects of the connUnitLinkTable.

Note The internal port numbers for the switch. The Core Switch 2/64 and SAN Director 2/128 support 0 through maximum number of ports.

**connUnitPortStatObject**

OID 1.3.6.1.3.94.1.10.1.19

Description This contains the OID of the first object of the table that contains the statistics for this particular port. If this has a value of 0, there are no statistics available for this port. The port type information helps identify the statistics objects found in the table. From this point, use the `getNext` command to get the next statistics object. When the first part of the OID changes, the end of table is reached.

Note Mapped to connUnitPortStatFabricUnitId.

**connUnitPortProtocolCap**


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**Note:** Not supported in Fabric OS v2.6.1.

---

OID 1.3.6.1.3.94.1.10.1.20

Description This is the bit mask that specifies the driver-level protocol capability of this port.

If this is not applicable, return all bits set to 0.

Return value = 07F

Note The bits have the following definition:

- 0 = unknown
- 1 = Loop
- 2 = Fabric
- 4 = SCSI
- 8 = TCP/IP
- 16 = VI

**connUnitPortProtocolOp**

---

**Note:** Not supported in Fabric OS v2.6.1.

---

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.10.1.21   |
| Description | <p>This is the bit mask that specifies the driver level protocols that are currently operational.</p> <p>Return value = 07F</p>  |
| Note        | <p>If this is not applicable, return all bits set to zero. The bits have the following definition:</p> <ul style="list-style-type: none"><li>0 = unknown</li><li>1 = Loop</li><li>2 = Fabric</li><li>4 = SCSI</li><li>8 = TCP/IP</li><li>16 = VI</li></ul> |

**connUnitPortNodeWwn**

---

**Note:** Not supported in Fabric OS v2.6.1.

---

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.10.1.22   |
| Description | <p>The node World Wide Name of the port, if applicable; otherwise, an empty string.</p> <p>All related ports in a group should have the same node WWN value. The container is defined as the largest physical entity.</p> <p><b>Example:</b></p> <p>All ports on HBAs on a host will have the same node WWN. All ports on the same storage subsystem will have the same node WWN.</p> <p>This is in IEEE Extended format and the extension contains the internal port number of each port.</p> |
| Note        | <p>The internal port number is 1 less than the port index. For example, if the switch has WWN 10:00:00:60:69:10:02:18, then port number 0 and 6 have WWN 20:00:00:60:69:10:02:18 and 20:06:00:60:69:10:02:18, respectively. However, the embedded port has WWN 10:00:00:60:69:10:02:18, the same as the switch.</p>  |

**connUnitPortHWState**


---

**Note:** Not supported in Fabric OS v2.6.1.

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|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.10.1.23   |
| Description | The state of the port as detected by the hardware. Possible values are: <ul style="list-style-type: none"> <li>— unknown (1)</li> <li>— failed (2) Port failed diagnostics (port_flt_state).</li> <li>— bypassed (3) FCAL bypass, loop only (not used).</li> <li>— active (4) Connected to a device (light and sync are present).</li> <li>— loopback (5) Port in ext loopback (loopback state).</li> <li>— txfault (6) Transmitter fault (bad GBIC).</li> <li>— noMedia (7) Media not installed (GBIC removed).</li> <li>— linkDown (8) Waiting for activity—rx sync (light with no sync).</li> </ul> |

**Connectivity Unit Event Table****connUnitEventTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.11   |
| Description | The table of connectivity unit events. Errors, warnings, and information should be reported in this table.                                      |
| Note        | (v3.0 only) This table contains the 64 most-recent event log entries.<br>(v4.0 only) This table contains the 255 most-recent event log entries. |

**connUnitEventEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.11.1  |
| Description | Each entry contains information on a specific event for the given connectivity unit. |
| Index       | connUnitEventUnitId<br>connUnitEventIndex  |

**connUnitEventUnitId**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.11.1.1   |
| Description | The connUnitId of the connectivity unit that contains this event table. |
| Note        | Same as connUnitId.   |

**connUnitEventIndex**

OID 1.3.6.1.3.94.1.11.1.2

Description Each connectivity unit has its own event buffer. As it wraps, it might write over previous events. This object is an index into the buffer. It is recommended that this table is read using getNext to retrieve the initial table. The management application should read the event table at periodic intervals and then determine if any new entries were added by comparing the last known index value with the current highest index value. The management application should then update its copy of the event table. If the read interval is too long, it is possible that there might be events that might not be contained in the agent's internal event buffer.

**Example:**

An agent might read events 50-75.

At the next read interval, connUnitEventCurrID is 189. If the management application tries to read event index 76 and the agent's internal buffer is 100 entries maximum, event index 76 is no longer available.

The index value is an incrementing integer starting from 1 every time there is a table reset. On table reset, all contents are emptied and all indices are set to 0. When an event is added to the table, the event is assigned the next-higher integer value than the last item entered into the table. If the index value reaches its maximum value, the next item entered causes the index value to roll over and start at 1 again.

Note Mapped to swEventIndex.

**connUnitEventId**

OID 1.3.6.1.3.94.1.11.1.3

Description The internal event ID. It is incremented for each event, ranging from 0 to connUnitMaxEvents. Not used as table index to simplify the agent implementation. When this reaches the end of the range specified by connUnitMaxEvents, the ID rolls over to start at 0. This value is set back to 0 at reset. The relationship of this value to the index is that internal event ID might represent a smaller number than a 32-bit integer (for example, maximum 100 entries) and would have a value range only up to connUnitMaxEvents.

Note Same function as connUnitEventIndex.

**connUnitREventTime**

OID 1.3.6.1.3.94.1.11.1.4

Description This is the real time when the event occurred. It has the following format:

DDMMYYYY HHMMSS

where:

DD = day number

MM = month number

YYYY = year

HH = hours

MM = minutes

SS = seconds

If not applicable, returns a null string.

**connUnitEventTime**

OID 1.3.6.1.3.94.1.11.1.5

Description This is the sysUpTime time stamp when the event occurred.

**connUnitEventSeverity**

OID 1.3.6.1.3.94.1.11.1.6

Description The event severity level. The mapping between errorlog severity level and this variable is:

| Error log         | FA-MIB       |
|-------------------|--------------|
| none (0)          | unknown (1)  |
| Critical (1)      | critical (4) |
| Error (2)         | error (5)    |
| Warning (3)       | warning (6)  |
| Informational (4) | info (8)     |
| Debug (5)         | debug (9)    |

Note See FcEventSeverity in [Table 13](#) on page 208 for more information about severity.

**connUnitEventType**

OID 1.3.6.1.3.94.1.11.1.7

Description The type of this event:

- unknown (1)
- other (2)
- status (3)
- configuration (4)
- topology (5)

Note Always set to 2 (other).

**connUnitEventObject**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.11.1.8   |
| Description | This is used with the connUnitEventType to identify to which object the event refers. It can be the OID of a connectivity unit or of another object, like connUnitPortStatus. |
| Note        | Always set to null.   |

**connUnitEventDescr**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.11.1.9   |
| Description | The description of the event.   |
| Note        | Same as the string shown in the Telnet command <code>errShow</code> . |

## Connectivity Unit Link Table

**connUnitLinkTable**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.12  |
| Description | A list of links known to this agent from this connectivity unit to other connectivity units: X is switch data and Y is other end.  |
| Note        | <p>The link table is intended to organize and communicate any information the agent has that might assist a management application to discover the connectivity units in the framework and the topology of their interconnect. The goal is to assist the management application by mapping the elements of the framework in addition to listing them.</p> <p>With this goal, the agent should include as much as it possesses about any links from its own connectivity units to others, including links among its own units.</p> <p>An agent should include partial information about links if it is not able to fully define them in accord with the following structure; however, the information must include either a nonzero connUnitNodeId—or a nonzero connUnitPortWwn—for each end of the link.</p> <p>If the agent is able to discover links that do not directly attach to members of its agency and its discovery algorithm gives some assurance that the links are recently valid, it might include these links.</p> <p>Link information entered by administrative action might be included (even if it is not validated directly) if the link has at least one endpoint in this agency, but it should not be included otherwise.</p> <p>A connectivity unit should fill the table in as best it can. One of the methods to fill this in would be to use the <code>RNID ELS</code> command (ANSI document 99-422v0). This command queries a port for the information needed for the link table.</p> |



This table is accessed either directly, if the management software has an index value, or using `getNext`. The values of the indexes are not required to be contiguous. Each entry created in this table is assigned an index. This relationship is kept persistent until the entry is removed from the table or the system is reset. The total number of entries is defined by the size of the table.

For an entry to be considered valid, both the X (local) and the Y (remote) values need to have one valid value.

#### **connUnitLinkEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.12.1   |
| Description | An entry describing a particular link to another.                 |
| Index       | <code>connUnitLinkUnitId</code><br><code>connUnitLinkIndex</code> |

#### **connUnitLinkId**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.12.1.1   |
| Description | The <code>connUnitId</code> of the connectivity unit that contains this link table. |
| Note        | Set to WWN of the local switch.   |

#### **connUnitLinkIndex**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.12.1.2  |
| Description | This value is used to create a unique value for each entry in the link table with the same <code>connUnitLinkId</code> . The value can be reused only if it is not currently in use and the value is the next candidate to be used. This value is allowed to wrap at the highest value represented by the number of bits. This value is reset to 0 when the system is reset and the first value to be used is 1. |
| Note        | Indexes 1 through the maximum number of ports are reserved for ISL.<br><br>Indexes maximum number of ports + 1 and above are reserved for end devices and are calculated based on <code>portID</code> of the end devices.  |

#### **connUnitLinkNodeIDX**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.12.1.3   |
| Description | The node WWN of the unit at one end of the link. If the node WWN is unknown and the node is a <code>connUnit</code> in the responding agent, then the value of this object must be equal to its <code>connUnitID</code> . |
| Note        | WWN of the local switch.  |

**connUnitLinkPortNumberX**

OID 1.3.6.1.3.94.1.12.1.4

Description The port number on the unit specified by connUnitLinkNodeIdX, if known; otherwise, -1. If the value is nonnegative, then it is equal to connUnitPortPhysicalNumber.

Note ISL: Physical port number of the E\_Port.  
Device: Physical port # to which the device is connected.

**connUnitLinkPortWwnX**

OID 1.3.6.1.3.94.1.12.1.5

Description The port WWN of the unit specified by connUnitLinkNodeIdX, if known; otherwise, 16 octets of binary 0.

Note This is the WWN of the port to which the device is connected.

**connUnitLinkNodeIdY**

OID 1.3.6.1.3.94.1.12.1.6

Description The node WWN of the unit at the other end of the link. If the node WWN is unknown and the node is a connUnit in the responding SNMP agency, then the value of this object must be equal to its connUnitID.

Note ISL: WWN of the remote switch.  
Device: Node name of the device.

**connUnitLinkPortNumberY**

OID 1.3.6.1.3.94.1.12.1.7

Description The port number on the unit specified by connUnitLinkNodeIdY, if known; otherwise, -1. If the value is nonnegative, it is equal to connUnitPortPhysicalNumber.

Note ISL: Physical port number of the remote port.  
Device: -1.

**connUnitLinkPortWwnY**

OID 1.3.6.1.3.94.1.12.1.8

Description The port WWN on the unit specified by connUnitLinkNodeIdY, if known; otherwise, 16 octets of binary 0.

Note ISL: WWN of the remote port.  
Device: Port name.

**connUnitLinkAgentAddressY**

OID 1.3.6.1.3.94.1.12.1.9

Description The address of an FCMGMT MIB agent for the node identified by connUnitLinkNodeIdY, if known; otherwise, 16 octets of binary 0.

Note ISL: IP address (IPv4).  
Device: 0 (Null).

**connUnitLinkAgentAddressTypeY**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.12.1.10   |
| Description | If connUnitLinkAgentAddressY is nonzero, it is a protocol address. ConnUnitLinkAgentAddressTypeY is the “address family number” assigned by IANA to identify the address format (for example, 1 is Ipv4, 2 is Ipv6). |
| Note        | ISL: Type 2.<br>Device: 0 (Null).  |

**connUnitLinkAgentPortY**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.12.1.11  |
| Description | The IP port number for the agent. This is provided in case the agent is at a nonstandard SNMP port. |
| Note        | ISL: IP port.<br>Device: 0 (Null).  |

**connUnitLinkUnitTypeY**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.1.12.1.12   |
| Description | Type of the FC connectivity unit, as defined in connUnitType.<br>ISL: Switch device.<br>End devices: End device types based on an FCP Inquiry (see <a href="#">Table 14</a> ). |

**Table 14: connUnitLinkUnitTypeY End Devices**

| Storage System  | Storage Subsystem       | Unknown | Other  |
|---|-------------------------|---------|--|
| Direct Access<br>Sequential Access<br>Write-Once<br>CD-ROM<br>Optical | Medium Changer<br>Array | Unknown | Anything else<br>(printer device,<br>processor device,<br>scanner, and so<br>on) |

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**Note:** HP does not support hubs.

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**connUnitLinkConnIdY**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.1.12.1.13  |
| Description | This is the Fibre Channel ID of this port. If the connectivity unit is a switch, this is expected to be a Big Endian value of 24 bits. If this is loop, then it is the AL_PA that is connected. If this is an E_port, then it contains only the domain ID. If not any of those, unknown or cascaded loop, return all bits set to 1. |
| Note        | ISL: Port ID of the remote port.<br>Device: Port ID of the remote port.   |

**connUnitLinkCurrIndex**

**Note:** Not supported in Fabric OS v2.6.1.

|             |                           |
|-------------|---------------------------|
| OID         | 1.3.6.1.3.94.1.12.1.14    |
| Description | The last-used link index. |

**Statistics Group**

**Note:** Not supported in Fabric OS v2.6.1. Port types are aggregated into a port type class, such as all the fabric port types.

Each individual port has only one statistics table. For all objects in the statistics table, if the object is not supported by the conn unit, then the high order bit is set to 1, with all other bits set to 0 (for example, the last eight bytes of the returned value might be ...:80 00 00 00 00 00 00 00).

The high order bit is reserved to indicate whether the object is supported. All objects start at a value of 0 at hardware initialization and continue incrementing until end of 63 bits and then wrap to 0. This is the case for all Class 1 Frames; HP does not support them.

**connUnitPortStatTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5                                |
| Description | A list of statistics for the fabric port types. |

**connUnitPortStatEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1                              |
| Description | An entry describing port statistics.            |
| Index       | connUnitPortStatUnitId<br>connUnitPortStatIndex |

**connUnitPortStatUnitId**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.1  |
| Description | The connUnitId of the connectivity unit that contains this port statistics table. |

**connUnitPortStatIndex**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.4.5.1.2   |
| Description | A unique value among all entries in this table, between 0 and connUnitNumPort[connUnitPortUnitId]. |

**connUnitPortStatCountError**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.4.5.1.3                                   |
| Description | A count of the errors that have occurred on this port. |

**connUnitPortStatCountTxObjects**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.4.5.1.4   |
| Description | The number of frames, packets, I/Os, and so forth, that have been transmitted by this port.  |
| Note        | A Fibre Channel frame starts with SOF and ends with EOF. FC loop devices should not count frames passed through. This value represents the sum total for all other Tx objects. |

**connUnitPortStatCountRxObjects**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.4.5.1.5   |
| Description | The number of frames, packets, IOs, and so forth, that have been received by this port.  |
| Note        | A Fibre Channel frame starts with SOF and ends with EOF. FC loop devices should not count frames passed through. This value represents the sum total for all other Rx objects. |

**connUnitPortStatCountTxElements**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.6  |
| Description | The number of octets or bytes that have been transmitted by this port. There is a one-second periodic polling of the port. This value is saved and compared with the next polled value to compute net throughput. |
| Note        | For Fibre Channel, ordered sets are not included in the count.  |

**connUnitPortStatCountRxElements**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.4.5.1.7   |
| Description | The number of octets or bytes that have been received by this port. There is a one-second periodic polling of the port. This value is saved and compared with the next polled value to compute net throughput. |
| Note        | For Fibre Channel, ordered sets are not included in the count.   |

**connUnitPortStatCountBBCreditZero**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.4.5.1.8   |
| Description | The number of transitions in or out of BB credit zero state. The other side is not providing any credit. |
| Note        | This is a Fibre Channel-only statistic.  |

**connUnitPortStatCountInputBuffersFull**

---

**Note:** Not supported.

---

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.9  |
| Description | The number of occurrences when all input buffers of a port were full and outbound buffer-to-buffer credit transitioned to 0. There is no credit to provide to other side.<br><br>Return Value: 80 0 0 0 0 0 0 0 (Not Supported) |
| Note        | This is a Fibre Channel-only statistic.   |

**connUnitPortStatCountFBSYFrames**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.4.5.1.10  |
| Description | The number of times that FBSY was returned to this port as a result of a frame that could not be delivered to the other end of the link. This occurs if either the fabric or the destination port is temporarily busy. FBSY can occur only on SOFc1 frames (the frames that establish a connection). |
| Note        | This is a Fibre Channel-only statistic. This is the sum of all classes. If you cannot keep the by-class counters, then keep the sum counters.  |

**connUnitPortStatCountPBSYFrames**

---

**Note:** Not supported.

---

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.11   |
| Description | The number of times that PBSY was returned to this port as a result of a frame that could not be delivered to the other end of the link. This occurs if the destination port is temporarily busy. PBSY can occur only on SOFc1 frames (the frames that establish a connection).<br><br>Return Value: 80 0 0 0 0 0 0 0 (not supported) |
| Note        | This is a Fibre Channel-only statistic. This is the sum of all classes. If you cannot keep the by class counters, keep the sum counters.  |

**connUnitPortStatCountFRJTFrames**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.12   |
| Description | The number of times that FRJT was returned to this port as a result of a frame that was rejected by the fabric. |
| Note        | This is the total for all classes and is a Fibre Channel-only statistic.  |

**connUnitPortStatCountPRJTFrames**


---

**Note:** Not supported.

---

OID 1.3.6.1.3.94.4.5.1.13

Description The number of times that FRJT was returned to this port as a result of a frame that was rejected at the destination N\_Port.

Return Value: 80 0 0 0 0 0 0

Note This is the total for all classes and is a Fibre Channel-only statistic.

**connUnitPortStatCountClass1RxFrames**

OID 1.3.6.1.3.94.4.5.1.14

Description The number of Class 1 frames received at this port.

Note This is a Fibre Channel-only statistic.  
HP does not support Class 1 frames.

**connUnitPortStatCountClass1TxFrames**

OID 1.3.6.1.3.94.4.5.1.15

Description The number of Class 1 frames transmitted out this port.

Note This is a Fibre Channel-only statistic.  
HP does not support Class 1 frames.

**connUnitPortStatCountClass1FBSYFrames**

OID 1.3.6.1.3.94.4.5.1.16

Description The number of times that FBSY was returned to this port as a result of a Class 1 frame that could not be delivered to the other end of the link. This occurs if either the fabric or the destination port is temporarily busy. FBSY can occur only on SOFc1 frames (the frames that establish a connection).

Note This is a Fibre Channel-only statistic.  
HP does not support Class 1 frames.

**connUnitPortStatCountClass1PBSYFrames**

OID 1.3.6.1.3.94.4.5.1.17

Description The number of times that PBSY was returned to this port as a result of a Class 1 frame that could not be delivered to the other end of the link. This occurs if the destination N\_Port is temporarily busy. PBSY can occur only on SOFc1 frames (the frames that establish a connection).

Note This is a Fibre Channel-only statistic.  
HP does not support Class 1 frames.

**connUnitPortStatCountClass1FRJTFrames**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.18   |
| Description | The number of times that FRJT was returned to this port as a result of a Class 1 frame that was rejected by the fabric. |
| Note        | This is a Fibre Channel-only statistic.<br>HP does not support Class 1 frames.  |

**connUnitPortStatCountClass1PRJTFrames**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.19   |
| Description | The number of times that PRJT was returned to this port as a result of a Class 1 frame that was rejected at the destination N_Port. |
| Note        | This is a Fibre Channel-only statistic.<br>HP does not support Class 1 frames.  |

**connUnitPortStatCountClass2RxFrames**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.20                               |
| Description | The number of Class 2 frames received at this port. |
| Note        | This is a Fibre Channel-only statistic.             |

**connUnitPortStatCountClass2TxFrames**

---

**Note:** Not supported.

---

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.4.5.1.21  |
| Description | The number of Class 2 frames transmitted from this port.<br><br>Return value: 80 0 0 0 0 0 0 |
| Note        | This is a Fibre Channel-only statistic.  |

**connUnitPortStatCountClass2FBSYFrames**

---

**Note:** Not supported.

---

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.4.5.1.22  |
| Description | The number of times that FBSY was returned to this port as a result of a Class 2 frame that could not be delivered to the other end of the link. This occurs if either the Fabric or the destination port is temporarily busy. FBSY can occur only on SOFc1 frames (the frames that establish a connection).<br><br>Return value: 80 0 0 0 0 0 0 |
| Note        | This is a Fibre Channel-only statistic.  |



**connUnitPortStatCountClass2PBSYFrames**


---

**Note:** Not supported.

---

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.23   |
| Description | The number of times that PBSY was returned to this port as a result of a Class 2 frame that could not be delivered to the other end of the link. This occurs if the destination N_Port is temporarily busy. PBSY can occur only on SOFc1 frames (the frames that establish a connection).<br><br>Return value: 80 0 0 0 0 0 0 |
| Note        | This is a Fibre Channel-only statistic.   |

**connUnitPortStatCountClass2FRJTFrames**


---

**Note:** Not supported.

---

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.24   |
| Description | The number of times that FRJT was returned to this port as a result of a Class 2 frame that was rejected by the fabric.<br><br>Return value: 80 0 0 0 0 0 0 |
| Note        | This is a Fibre Channel-only statistic.   |

**connUnitPortStatCountClass2PRJTFrames**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.25   |
| Description | The number of times that FRJT was returned to this port as a result of a Class 2 frame that was rejected at the destination N_Port.<br><br>Return value: 80 0 0 0 0 0 0 (not supported) |
| Note        | This is a Fibre Channel-only statistic.   |

**connUnitPortStatCountClass3RxFrames**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.26                               |
| Description | The number of Class 3 frames received at this port. |
| Note        | This is a Fibre Channel-only statistic.             |

**connUnitPortStatCountClass3TxFrames**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.4.5.1.27                                    |
| Description | The number of Class 3 frames transmitted from this port. |
| Note        | This is a Fibre Channel-only statistic.                  |

**connUnitPortStatCountClass3Discards**

OID 1.3.6.1.3.94.4.5.1.28

Description The number of Class 3 frames that were discarded upon receipt at this port. There is no FBSY or FRJT generated for Class 3 frames. They are discarded if they cannot be delivered.

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountRxMulticastObjects**

OID 1.3.6.1.3.94.4.5.1.29

Description The number of multicast frames or packets received at this port.

**connUnitPortStatCountTxMulticastObjects**

OID 1.3.6.1.3.94.4.5.1.30

Description The number of multicast frames or packets transmitted from this port.

**connUnitPortStatCountRxBroadcastObjects**

OID 1.3.6.1.3.94.4.5.1.31

Description The number of broadcast frames or packets received at this port.

Return value: 80 0 0 0 0 0 0 (not supported)

**connUnitPortStatCountTxBroadcastObjects**

OID 1.3.6.1.3.94.4.5.1.32

Description The number of broadcast frames or packets transmitted from this port. On a Fibre Channel loop, count only OPNr frames generated.

Return value: 80 0 0 0 0 0 0 (not supported)

**connUnitPortStatCountRxLinkResets**

OID 1.3.6.1.3.94.4.5.1.33

Description The number of link resets. This is the number of LR's received.

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountTxLinkResets**

OID 1.3.6.1.3.94.4.5.1.34

Description The number of link resets. This is the number LR's transmitted.

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountNumberLinkResets**

OID 1.3.6.1.3.94.4.5.1.35

Description The number of link resets and LIPs detected at this port. The number times the reset link protocol is initiated. This is a count of the logical resets, a count of the number of primitives.

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountRxOfflineSequences**

OID 1.3.6.1.3.94.4.5.1.36

Description The number of primitive offline sequences (OLSS) received at this port.

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountTxOfflineSequences**

OID 1.3.6.1.3.94.4.5.1.37

Description The number of primitive OLSSs transmitted by this port.

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountNumberOfflineSequences**

OID 1.3.6.1.3.94.4.5.1.38

Description The number of primitive OLSSs received at this port.

Return Value: 80 0 0 0 0 0 0 (not supported)

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountLinkFailures**

OID 1.3.6.1.3.94.4.5.1.39

Description The number of link failures. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8)

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountInvalidCRC**

OID 1.3.6.1.3.94.4.5.1.40

Description The number of frames received with invalid CRC. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8) Loop ports should not count CRC errors passing through when monitoring.

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountInvalidTxWords**

OID 1.3.6.1.3.94.4.5.1.41

Description The number of invalid transmission words received at this port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8)

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountPrimitiveSequenceProtocolErrors**

OID 1.3.6.1.3.94.4.5.1.42

Description The number of primitive sequence protocol errors detected at this port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8)

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountLossofSignal**

OID 1.3.6.1.3.94.4.5.1.43

Description The number of instances of signal loss detected at port.  
This count is part of the Link Error Status Block (LESB). (FC-PH 29.8)

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountLossofSynchronization**

OID 1.3.6.1.3.94.4.5.1.44

Description The number of instances of synchronization loss detected at port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8)

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountInvalidOrderedSets**

OID 1.3.6.1.3.94.4.5.1.45

Description The number of invalid ordered sets received at port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8).

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountFramesTooLong**

OID 1.3.6.1.3.94.4.5.1.46

Description The number of frames received at this port where the frame length was greater than what was agreed to in fabric login/port login (FLOGI/PLOGI). This could be caused by losing the end of frame delimiter.

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountFramesTruncated**

OID 1.3.6.1.3.94.4.5.1.47

Description The number of frames received at this port where the frame length was less than the minimum indicated by the frame header - normally 24 bytes, but it could be more if the DFCTL field indicates an optional header should have been present.

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountAddressErrors**

OID 1.3.6.1.3.94.4.5.1.48

Description The number of frames received with unknown addressing. For example, unknown SID or DID. The SID or DID is not known to the routing algorithm.

Note This is a Fibre Channel-only statistic.

**connUnitPortStatCountDelimiterErrors**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.4.5.1.49  |
| Description | The number of invalid frame delimiters received at this port. An example is a frame with a Class 2 start and a Class 3 at the end. |
| Note        | This is a Fibre Channel-only statistic.  |

**connUnitPortStatCountEncodingDisparityErrors**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.4.5.1.50                                 |
| Description | The number of disparity errors received at this port. |
| Note        | This is a Fibre Channel-only statistic.               |

**Service Group**

---

**Note:** Not supported in Fabric OS v2.6.1.

---

Implementation of the Service group is mandatory for all systems.  
The Service group contains the following subgroups:

- Connectivity Unit Service Scalars Group
- Connectivity Unit Service Tables Group

**Connectivity Unit Service Scalars Group**

Implementation of the Connectivity Unit Service Scalars group is mandatory for all systems.

**connUnitSnsMaxEntry**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.5.1.1                          |
| Description | The maximum number of entries in the table. |

**Connectivity Unit Service Tables Group**

Implementation of the Connectivity Unit Service Tables group is mandatory for all systems.

**connUnitSnsTable**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.5.2.1  |
| Description | This table contains an entry for each object registered with this port in the switch. |

**connUnitSnsEntry**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.5.2.1.1   |
| Description | The simple name server (SNS) table for the port represented by connUnitSnsPortIndex. |
| Index       | connUnitSnsId<br>connUnitSnsPortIndex<br>connUnitSnsPortIdentifier                   |

**connUnitSnsId**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.5.2.1.1.1  |
| Description | The connUnitId of the connectivity unit that contains this name server table. |

**connUnitSnsPortIndex**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.5.2.1.1.2  |
| Description | The physical port number of this SNS table entry. Each physical port has an SNS table with 1-n entries indexed by connUnitSnsPortIdentifier (port address). |

**connUnitSnsPortIdentifier**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.5.2.1.1.3                               |
| Description | The port identifier for this entry in the SNS table. |

**connUnitSnsPortName**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.5.2.1.1.4                         |
| Description | The port name for this entry in the SNS table. |

**connUnitSnsNodeName**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.5.2.1.1.5                         |
| Description | The node name for this entry in the SNS table. |

**connUnitSnsClassOfSvc**

|             |  |
|-------------|--|
| OID         | 1.3.6.1.3.94.5.2.1.1.6   |
| Description | The Classes of Service offered by this entry in the SNS table. |

**connUnitSnsNodeIPAddress**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.5.2.1.1.7  |
| Description | The IPv6 formatted address of the Node for this entry in the SNS table. |

**connUnitSnsProcAssoc**

|             |   |
|-------------|---|
| OID         | 1.3.6.1.3.94.5.2.1.1.8                                  |
| Description | The process associator for this entry in the SNS table. |

**connUnitSnsFC4Type**

OID 1.3.6.1.3.94.5.2.1.1.9

Description The FC-4 types supported by this entry in the SNS table.

**connUnitSnsPortType**

OID 1.3.6.1.3.94.5.2.1.1.10

Description The port type of this entry in the SNS table.

**connUnitSnsPortIPAddress**

OID 1.3.6.1.3.94.5.2.1.1.11

Description The IPv6 formatted address of this entry in the SNS table.

**connUnitSnsFabricPortName**

OID 1.3.6.1.3.94.5.2.1.1.12

Description The fabric port name of this entry in the SNS table.

**connUnitSnsHardAddress**

OID 1.3.6.1.3.94.5.2.1.1.13

Description The hard address of this entry in the SNS table.

**connUnitSnsSymbolicPortName**

OID 1.3.6.1.3.94.5.2.1.1.14

Description The symbolic port name of this entry in the SNS table.

**connUnitSnsSymbolicNodeName**

OID 1.3.6.1.3.94.5.2.1.1.15

Description The symbolic node name of this entry in the SNS table.

## SNMP Trap Registration Group

**trapMaxClients**

OID 1.3.6.1.3.94.2.1

Description The maximum number of SNMP trap recipients supported by the connectivity unit.

Note Set to 6.

**trapClientCount**

OID 1.3.6.1.3.94.2.2

Description The current number of rows in the trap table.

**trapRegTable**

OID 1.3.6.1.3.94.2.3

Description A table containing a row for each IP address and port number to which traps are sent.

**trapRegEntry**

OID 1.3.6.1.3.94.2.3.1

Description IP-port pair for a specific client.

Index trapRegIpAddress  
trapRegPort

**trapRegIpAddress**

OID 1.3.6.1.3.94.2.3.1.1

Description The IP address of a client registered for traps.

**trapRegPort**

OID 1.3.6.1.3.94.2.3.1.2

Description The UDP port to send traps to for this host. Normally this would be the standard trap port (162). This object is an index and must be specified to create a row in this table.

Note Set to 162.

**trapRegFilter**

OID 1.3.6.1.3.94.2.3.1.3

Description This value defines the trap severity filter for this trap host. The connUnit sends traps to this host that have a severity level less than or equal to this value. The default value of this object is Warning. The mapping between errorlog severity level and this variable is:

| Error log         | FA-MIB       |
|-------------------|--------------|
| none (0)          | unknown (1)  |
| Critical (1)      | critical (4) |
| Error (2)         | error (5)    |
| Warning (3)       | warning (6)  |
| Informational (4) | info (8)     |
| Debug (5)         | debug (9)    |

Note This severity applies to all entries. See FcEventSeverity in [Table 13](#) on page 208.

The values 1, 3, 7, and 10 are not valid for SET operations.

**trapRegRowState**

OID 1.3.6.1.3.94.2.3.1.4

Description Specifies the state of the row. See [Table 15](#) for Read/Write descriptions.



**Table 15: TrapRegRowState for Read/Write**

| State           | Description (Read)  | Description (Write)   |
|-----------------|---|---|
| rowDestroy (1)  | Read: Can never happen.   | Write: Remove this row from the table.  |
| rowInactive (2) | Read: Indicates that this row does exist but that traps are not enabled to be sent to the target. | Write: If the row does not exist and the agent allows writes to the trap table, then a new row is created. The values of the optional columns are set to default values. Traps are not enabled to be sent to the target. If the row already existed, then traps are disabled from being sent to the target. |
| rowActive (3)   | Read: Indicates that this row exists and that traps are enabled to be sent to the target.         | Write: If the row does not exist and the agent allows writes to the trap table, then a new row is created. The values of the optional columns are set to default values. Traps are enabled to be sent to the target. If the row already exists, then traps are enabled to be sent to the target.            |

---

**Note:** This entry always returns rowActive and allows for read-only.

---

## Revision Number Scalar

### revisionNumber

OID 1.3.6.1.3.94.3

Description This is the revision number for this MIB. The format of the revision value is as follows:

- 0 = High order major revision number
- 1 = Low order major revision number
- 2 = High order minor revision number
- 3 = Low order minor revision number

The value is stored as an ASCII value. The following is the current value of this object:

- 0 = 0
- 1 = 3
- 2 = 0
- 3 = 0

This defines a revision of 03.00.

Note Set to 0300.

Set to 0300.

## Unsupported Tables

The Connectivity Unit Port Statistics Fabric Table is supported only in v2.6.1

HP does not support the following:

- Connectivity Unit Port Statistics Hub Table
- Connectivity Unit Port Statistics SCSI Table
- Connectivity Unit Port Statistics LAN/WAN Table

## Related Traps

### **connUnitStatusChange**

Enterprise fcmgmt

Variables connUnitStatus, connUnitState

Description The overall status of the connectivity unit has changed.

Recommended severity level (for filtering): alert.

Note Generated when connUnitStatus changes. See “[connUnitStatus](#)” on page 212 for a description of how the value is calculated.

### **connUnitDeletedTrap**

Enterprise fcmgmt

Variables connUnitId

Description A connUnit has been deleted from this agent.

Recommended severity level (for filtering): warning.

Note Not implemented.

### **connUnitEventTrap**

Enterprise fcmgmt

Variables connUnitEventId, connUnitEventType, connUnitEventObject, connUnitEventDescr

Description An event has been generated by the connectivity unit.

Recommended severity level (for filtering): info.

### **connUnitSensorStatusChange**

Enterprise fcmgmt

Variables connUnitSensorStatus

Description Overall status of the connectivity unit has changed.

**connUnitPortStatusChange**

|             |  |
|-------------|--|
| Enterprise  | fcmgmt   |
| Variables   | connUnitPortStatus, connUnitPortState  |
| Description | Overall status of the connectivity unit changed. Recommended severity level (for filtering): alert.  |
| Note        | This trap sends the instance of connUnitPortName as part of the trap; the instance string is NULL, if the port name is not defined for the specified port. |



# MIB Object Groupings

# A

## Overview

This appendix provides a function-based listing of MIB objects. The following major sections specify the correlation of various switch objects to MIB objects:

- [Switch Variables](#), page 253
- [Sensor Variables](#), page 253
- [Port Variables](#), page 254
- [Event Variables](#), page 254
- [ISL and End Device Variables](#), page 254
- [SNMP Configuration Variables](#), page 255
- [HP StorageWorks 2 GB Switch Variables](#), page 255

## Switch Variables

MIB variables that assist in monitoring or modifying the status and state of switches are in the following tables or groups:

- [“Connectivity Unit Table”](#) on page 209
- [“Connectivity Unit Revisions Table”](#) on page 217
- [“FIBRE-CHANNEL-FE-MIB \(MIB-II branch\)”](#) on page 74
- [“FCFABRIC-ELEMENT-MIB \(Experimental Branch\)”](#) on page 96
- [“Flash Administration”](#) on page 159

## Sensor Variables

MIB variables that assist in monitoring or modifying the status and state of fans, power supply, and temperature are in the following tables or groups:

- [“Connectivity Unit Sensor Table”](#) on page 218
- [“swNumSensors”](#) on page 161

## Port Variables

MIB variables that assist in monitoring or modifying ports are in the following tables or groups:

### Variables for State and Status

- [“Connectivity Unit Port Table”](#) on page 220
- [“Fx\\_Port Table”](#) on page 82
- [“Fx\\_Port Configuration Table”](#) on page 105
- [“Fx\\_Port Status Table”](#) on page 84
- [“Fx\\_Port Operation Table”](#) on page 108
- [“Fx\\_Port Physical Level Table”](#) on page 109
- [“Fx\\_Port Capability Table”](#) on page 115
- [“Fibre Channel Port Group”](#) on page 168

### Variables for Statistics and Measurement

- [“Statistics Group”](#) on page 236
- [“Fx\\_Port Error Table”](#) on page 89
- [“Class 2 Accounting Table”](#) on page 92
- [“Capability Group”](#) on page 94

## Event Variables

MIB variables that assist in monitoring or modifying events are in the following tables or groups:

- [“Connectivity Unit Event Table”](#) on page 229
- [“Event Group”](#) on page 175

## ISL and End Device Variables

MIB variables that assist in monitoring or modifying ISL and end-devices are in the following tables or groups:

### ISL Variables and End Device Variables

- [“Fabric Group”](#) on page 164
- [“Fx\\_Port Fabric Login Table”](#) on page 86
- [“swFCPortName”](#) on page 173

## SNMP Configuration Variables

MIB variables that assist in configuring SNMP are in the following tables or groups:

- “[trapRegTable](#)” on page 248
- “[SW Agent Configuration Group](#)” on page 167

## HP StorageWorks 2 GB Switch Variables

MIB variables that assist in performance monitoring and trunking for the 2 GB switches ASIC chip are in the following tables or groups:

- “[swBlmPerfALPAMntTable](#)” on page 188
- “[swBlmPerfEEMntTable](#)” on page 189
- “[ASIC Performance Monitoring Group](#)” on page 188
- “[swFwFabricWatchLicense](#)” on page 177
- “[swTrunkTable](#)” on page 190
- “[swTrunkGrpTable](#)” on page 191





# MIB OIDs and Their Matching Object Names

## B

### MIB OIDs

This appendix provides a listing of the v3.1.x MIB object names and the corresponding MIB Object ID (OID) associated with each.

[Table 16](#) allows you to associate a MIB object name with its related OID.

**Table 16: MIB Object Name-OID Matrix**

| MIB Object Name           | OID                      | Page                |
|---------------------------|--------------------------|---------------------|
| iso                       | 1                        | <a href="#">40</a>  |
| org                       | 1.3                      | <a href="#">40</a>  |
| dod                       | 1.3.6                    | <a href="#">40</a>  |
| internet                  | 1.3.6.1                  | <a href="#">40</a>  |
| directory                 | 1.3.6.1.1                | <a href="#">40</a>  |
| mgmt                      | 1.3.6.1.2                | <a href="#">40</a>  |
| mib-2                     | 1.3.6.1.2.1              | <a href="#">40</a>  |
| fcFeMIB                   | 1.3.6.1.2.1.75           | <a href="#">75</a>  |
| fcFeMIBObjects            | 1.3.6.1.2.1.75.1         | <a href="#">75</a>  |
| fcFeConfig                | 1.3.6.1.2.1.75.1.1       | <a href="#">75</a>  |
| fcFeFabricName            | 1.3.6.1.2.1.75.1.1.1     | <a href="#">80</a>  |
| fcFeElementName           | 1.3.6.1.2.1.75.1.1.2     | <a href="#">80</a>  |
| fcFeModuleCapacity        | 1.3.6.1.2.1.75.1.1.3     | <a href="#">80</a>  |
| fcFeModuleTable           | 1.3.6.1.2.1.75.1.1.4     | <a href="#">80</a>  |
| fcFeModuleEntry           | 1.3.6.1.2.1.75.1.1.4.1   | <a href="#">80</a>  |
| fcFeModuleIndex           | 1.3.6.1.2.1.75.1.1.4.1.1 | <a href="#">80</a>  |
| fcFeModuleDescr           | 1.3.6.1.2.1.75.1.1.4.1.2 | <a href="#">76</a>  |
| fcFeModuleObjectID        | 1.3.6.1.2.1.75.1.1.4.1.3 | <a href="#">81</a>  |
| fcFeModuleOperStatus      | 1.3.6.1.2.1.75.1.1.4.1.4 | <a href="#">81</a>  |
| fcFeModuleLastChange      | 1.3.6.1.2.1.75.1.1.4.1.5 | <a href="#">81</a>  |
| fcFeModuleFxpPortCapacity | 1.3.6.1.2.1.75.1.1.4.1.6 | <a href="#">81</a>  |
| fcFeModuleName            | 1.3.6.1.2.1.75.1.1.4.1.7 | <a href="#">104</a> |
| fcFxpPortTable            | 1.3.6.1.2.1.75.1.1.5     | <a href="#">82</a>  |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name               | OID                       | Page |
|-------------------------------|---------------------------|------|
| fcFxPortEntry                 | 1.3.6.1.2.1.75.1.1.5.1    | 82   |
| fcFxPortIndex                 | 1.3.6.1.2.1.75.1.1.5.1.1  | 82   |
| fcFxPortName                  | 1.3.6.1.2.1.75.1.1.5.1.2  | 82   |
| fcFxPortFcphVersionHigh       | 1.3.6.1.2.1.75.1.1.5.1.3  | 82   |
| fcFxPortFcphVersionLow        | 1.3.6.1.2.1.75.1.1.5.1.4  | 82   |
| fcFxPortBbCredit              | 1.3.6.1.2.1.75.1.1.5.1.5  | 83   |
| fcFxPortRxBufSize             | 1.3.6.1.2.1.75.1.1.5.1.6  | 83   |
| fcFxPortRatov                 | 1.3.6.1.2.1.75.1.1.5.1.7  | 83   |
| fcFxPortEdtov                 | 1.3.6.1.2.1.75.1.1.5.1.8  | 83   |
| fcFxPortCosSupported          | 1.3.6.1.2.1.75.1.1.5.1.9  | 83   |
| fcFxPortIntermixSupported     | 1.3.6.1.2.1.75.1.1.5.1.10 | 83   |
| fcFxPortStackedConnMode       | 1.3.6.1.2.1.75.1.1.5.1.11 | 83   |
| fcFxPortClass2SeqDeliv        | 1.3.6.1.2.1.75.1.1.5.1.12 | 83   |
| fcFxPortClass3SeqDeliv        | 1.3.6.1.2.1.75.1.1.5.1.13 | 84   |
| fcFxPortHoldTime              | 1.3.6.1.2.1.75.1.1.5.1.14 | 84   |
| fcFeStatus                    | 1.3.6.1.2.1.75.1.2        | 75   |
| fcFxPortStatusTable           | 1.3.6.1.2.1.75.1.2.1      | 84   |
| fcFxPortStatusEntry           | 1.3.6.1.2.1.75.1.2.1.1    | 84   |
| fcFxPortID                    | 1.3.6.1.2.1.75.1.2.1.1.1  | 84   |
| fcFxPortBbCreditAvailable     | 1.3.6.1.2.1.75.1.2.1.1.2  | 84   |
| fcFxPortOperMode              | 1.3.6.1.2.1.75.1.2.1.1.3  | 85   |
| fcFxPortAdminMode             | 1.3.6.1.2.1.75.1.2.1.1.4  | 85   |
| fcFxPortPhysTable             | 1.3.6.1.2.1.75.1.2.2      | 85   |
| fcFxPortPhysEntry             | 1.3.6.1.2.1.75.1.2.2.1    | 85   |
| fcFxPortPhysAdminStatus       | 1.3.6.1.2.1.75.1.2.2.1.1  | 85   |
| fcFxPortPhysOperStatus        | 1.3.6.1.2.1.75.1.2.2.1.2  | 86   |
| fcFxPortPhysLastChange        | 1.3.6.1.2.1.75.1.2.2.1.3  | 86   |
| fcFxPortPhysRttov             | 1.3.6.1.2.1.75.1.2.2.1.4  | 86   |
| fcFxLoginTable                | 1.3.6.1.2.1.75.1.2.3      | 86   |
| fcFxLoginEntry                | 1.3.6.1.2.1.75.1.2.3.1    | 86   |
| fcFxPortNxLoginIndex          | 1.3.6.1.2.1.75.1.2.3.1.1  | 87   |
| fcFxPortFcphVersionAgreed     | 1.3.6.1.2.1.75.1.2.3.1.2  | 87   |
| fcFxPortNxPortBbCredit        | 1.3.6.1.2.1.75.1.2.3.1.3  | 87   |
| fcFxPortNxPortRxDataFieldSize | 1.3.6.1.2.1.75.1.2.3.1.4  | 87   |
| fcFxPortCosSuppAgreed         | 1.3.6.1.2.1.75.1.2.3.1.5  | 87   |
| fcFxPortIntermixSuppAgreed    | 1.3.6.1.2.1.75.1.2.3.1.6  | 87   |
| fcFxPortStackedConnModeAgreed | 1.3.6.1.2.1.75.1.2.3.1.7  | 87   |
| fcFxPortClass2SeqDelivAgreed  | 1.3.6.1.2.1.75.1.2.3.1.8  | 88   |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name               | OID                       | Page |
|-------------------------------|---------------------------|------|
| fcFxpPortClass3SeqDelivAgreed | 1.3.6.1.2.1.75.1.2.3.1.9  | 88   |
| fcFxpPortNxPortName           | 1.3.6.1.2.1.75.1.2.3.1.10 | 88   |
| fcFxpPortConnectedNxPort      | 1.3.6.1.2.1.75.1.2.3.1.11 | 88   |
| fcFxpPortBbCreditModel        | 1.3.6.1.2.1.75.1.2.3.1.12 | 88   |
| fcFeError                     | 1.3.6.1.2.1.75.1.3        | 75   |
| fcFxpPortErrorTable           | 1.3.6.1.2.1.75.1.3.1      | 89   |
| fcFxpPortErrorEntry           | 1.3.6.1.2.1.75.1.3.1.1    | 89   |
| fcFxpPortLinkFailures         | 1.3.6.1.2.1.75.1.3.1.1.1  | 89   |
| fcFxpPortSyncLosses           | 1.3.6.1.2.1.75.1.3.1.1.2  | 89   |
| fcFxpPortSigLosses            | 1.3.6.1.2.1.75.1.3.1.1.3  | 89   |
| fcFxpPortPrimSeqProtoErrors   | 1.3.6.1.2.1.75.1.3.1.1.4  | 89   |
| fcFxpPortInvalidTxWords       | 1.3.6.1.2.1.75.1.3.1.1.5  | 89   |
| fcFxpPortInvalidCrcs          | 1.3.6.1.2.1.75.1.3.1.1.6  | 89   |
| fcFxpPortDelimiterErrors      | 1.3.6.1.2.1.75.1.3.1.1.7  | 90   |
| fcFxpPortAddressIdErrors      | 1.3.6.1.2.1.75.1.3.1.1.8  | 90   |
| fcFxpPortLinkResetIns         | 1.3.6.1.2.1.75.1.3.1.1.9  | 90   |
| fcFxpPortLinkResetOuts        | 1.3.6.1.2.1.75.1.3.1.1.10 | 90   |
| fcFxpPortOlIns                | 1.3.6.1.2.1.75.1.3.1.1.11 | 90   |
| fcFxpPortOlOuts               | 1.3.6.1.2.1.75.1.3.1.1.12 | 90   |
| fcFeAccounting                | 1.3.6.1.2.1.75.1.4        | 75   |
| fcFxpPortC1AccountingTable    | 1.3.6.1.2.1.75.1.4.1      | 90   |
| fcFxpPortC1AccountingEntry    | 1.3.6.1.2.1.75.1.4.1.1    | 91   |
| fcFxpPortC1InFrames           | 1.3.6.1.2.1.75.1.4.1.1.1  | 91   |
| fcFxpPortC1OutFrames          | 1.3.6.1.2.1.75.1.4.1.1.2  | 91   |
| fcFxpPortC1InOctets           | 1.3.6.1.2.1.75.1.4.1.1.3  | 91   |
| fcFxpPortC1OutOctets          | 1.3.6.1.2.1.75.1.4.1.1.4  | 91   |
| fcFxpPortC1Discards           | 1.3.6.1.2.1.75.1.4.1.1.5  | 91   |
| fcFxpPortC1FbsyFrames         | 1.3.6.1.2.1.75.1.4.1.1.6  | 91   |
| fcFxpPortC1FrjtFrames         | 1.3.6.1.2.1.75.1.4.1.1.7  | 91   |
| fcFxpPortC1InConnections      | 1.3.6.1.2.1.75.1.4.1.1.8  | 92   |
| fcFxpPortC1OutConnections     | 1.3.6.1.2.1.75.1.4.1.1.9  | 92   |
| fcFxpPortC1ConnTime           | 1.3.6.1.2.1.75.1.4.1.1.10 | 92   |
| fcFxpPortC2AccountingTable    | 1.3.6.1.2.1.75.1.4.2      | 92   |
| fcFxpPortC2AccountingEntry    | 1.3.6.1.2.1.75.1.4.2.1    | 92   |
| fcFxpPortC2InFrames           | 1.3.6.1.2.1.75.1.4.2.1.1  | 92   |
| fcFxpPortC2OutFrames          | 1.3.6.1.2.1.75.1.4.2.1.2  | 92   |
| fcFxpPortC2InOctets           | 1.3.6.1.2.1.75.1.4.2.1.3  | 92   |
| fcFxpPortC2OutOctets          | 1.3.6.1.2.1.75.1.4.2.1.4  | 93   |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name           | OID                       | Page |
|---------------------------|---------------------------|------|
| fcFxC2PortDiscards        | 1.3.6.1.2.1.75.1.4.2.1.5  | 93   |
| fcFxC2PortFbsyFrames      | 1.3.6.1.2.1.75.1.4.2.1.6  | 93   |
| fcFxC2PortFrttFrames      | 1.3.6.1.2.1.75.1.4.2.1.7  | 93   |
| fcFxC3AccountingTable     | 1.3.6.1.2.1.75.1.4.3      | 93   |
| fcFxC3AccountingEntry     | 1.3.6.1.2.1.75.1.4.3.1    | 93   |
| fcFxC3InFrames            | 1.3.6.1.2.1.75.1.4.3.1.1  | 93   |
| fcFxC3OutFrames           | 1.3.6.1.2.1.75.1.4.3.1.2  | 93   |
| fcFxC3InOctets            | 1.3.6.1.2.1.75.1.4.3.1.3  | 94   |
| fcFxC3OutOctets           | 1.3.6.1.2.1.75.1.4.3.1.4  | 94   |
| fcFxC3Discards            | 1.3.6.1.2.1.75.1.4.3.1.5  | 94   |
| fcFeCapabilities          | 1.3.6.1.2.1.75.1.5        | 75   |
| fcFxCapTable              | 1.3.6.1.2.1.75.1.5.1      | 94   |
| fcFxCapEntry              | 1.3.6.1.2.1.75.1.5.1.1    | 94   |
| fcFxCapFcphVersionHigh    | 1.3.6.1.2.1.75.1.5.1.1.1  | 94   |
| fcFxCapFcphVersionLow     | 1.3.6.1.2.1.75.1.5.1.1.2  | 94   |
| fcFxCapBbCreditMax        | 1.3.6.1.2.1.75.1.5.1.1.3  | 95   |
| fcFxCapBbCreditMin        | 1.3.6.1.2.1.75.1.5.1.1.4  | 95   |
| fcFxCapRxDataFieldSizeMax | 1.3.6.1.2.1.75.1.5.1.1.5  | 95   |
| fcFxCapRxDataFieldSizeMin | 1.3.6.1.2.1.75.1.5.1.1.6  | 95   |
| fcFxCapCos                | 1.3.6.1.2.1.75.1.5.1.1.7  | 95   |
| fcFxCapIntermix           | 1.3.6.1.2.1.75.1.5.1.1.8  | 95   |
| fcFxCapStackedConnMode    | 1.3.6.1.2.1.75.1.5.1.1.9  | 95   |
| fcFxCapClass2SeqDeliv     | 1.3.6.1.2.1.75.1.5.1.1.10 | 95   |
| fcFxCapClass3SeqDeliv     | 1.3.6.1.2.1.75.1.5.1.1.11 | 96   |
| fcFxCapHoldTimeMax        | 1.3.6.1.2.1.75.1.5.1.1.12 | 96   |
| fcFxCapHoldTimeMin        | 1.3.6.1.2.1.75.1.5.1.1.13 | 96   |
| fcFeMIBConformance        | 1.3.6.1.2.1.75.2          | 75   |
| fcFeMIBCompliances        | 1.3.6.1.2.1.75.2.1        | 75   |
| fcFeMIBMinimumCompliance  | 1.3.6.1.2.1.75.2.1.1      |      |
| fcFeMIBFullCompliance     | 1.3.6.1.2.1.75.2.1.2      |      |
| fcFeMIBGroups             | 1.3.6.1.2.1.75.2.2        | 75   |
| fcFeConfigGroup           | 1.6.1.2.1.75.2.2.1        |      |
| fcFeStatusGroup           | 1.3.6.1.2.1.75.2.2.2      |      |
| fcFeErrorGroup            | 1.3.6.1.2.1.75.2.2.3      |      |
| fcFeClass1AccountingGroup | 1.3.6.1.2.1.75.2.2.4      |      |
| fcFeClass2AccountingGroup | 1.3.6.1.2.1.75.2.2.5      |      |
| fcFeClass3AccountingGroup | 1.3.6.1.2.1.75.2.2.6      |      |
| fcFeCapabilitiesGroup     | 1.3.6.1.2.1.75.2.2.7      |      |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name            | OID                       | Page |
|----------------------------|---------------------------|------|
| experimental               | 1.3.6.1.3                 | 98   |
| fibreChannel               | 1.3.6.1.3.42              | 98   |
| fcFabric                   | 1.3.6.1.3.42.2            | 98   |
| fcFe                       | 1.3.6.1.3.42.2.1          | 98   |
| fcFeConfig                 | 1.3.6.1.3.42.2.1.1        | 98   |
| fcFabricName               | 1.3.6.1.3.42.2.1.1.1      | 98   |
| fcElementName              | 1.3.6.1.3.42.2.1.1.2      | 98   |
| fcFeModuleCapacity         | 1.3.6.1.3.42.2.1.1.3      | 98   |
| fcFeModuleTable            | 1.3.6.1.3.42.2.1.1.4      | 98   |
| fcFeModuleEntry            | 1.3.6.1.3.42.2.1.1.4.1    | 99   |
| fcFeModuleIndex            | 1.3.6.1.3.42.2.1.1.4.1.1  | 99   |
| fcFeModuleDescr            | 1.3.6.1.3.42.2.1.1.4.1.2  | 99   |
| fcFeModuleObjectID         | 1.3.6.1.3.42.2.1.1.4.1.3  | 99   |
| fcFeModuleOperStatus       | 1.3.6.1.3.42.2.1.1.4.1.4  | 99   |
| fcFeModuleLastChange       | 1.3.6.1.3.42.2.1.1.4.1.5  | 99   |
| fcFeModuleFxpPortCapacity  | 1.3.6.1.3.42.2.1.1.4.1.6  | 99   |
| fcFeModuleName             | 1.3.6.1.3.42.2.1.1.4.1.7  | 99   |
| fcFxCnfTable               | 1.3.6.1.3.42.2.1.1.5      | 99   |
| fcFxCnfEntry               | 1.3.6.1.3.42.2.1.1.5.1    | 99   |
| fcFxCnfModuleIndex         | 1.3.6.1.3.42.2.1.1.5.1.1  | 99   |
| fcFxCnfFxpPortIndex        | 1.3.6.1.3.42.2.1.1.5.1.2  | 99   |
| fcFxpPortName              | 1.3.6.1.3.42.2.1.1.5.1.3  | 99   |
| fcFxpPortFcphVersionHigh   | 1.3.6.1.3.42.2.1.1.5.1.4  | 99   |
| fcFxpPortFcphVersionLow    | 1.3.6.1.3.42.2.1.1.5.1.5  | 99   |
| fcFxpPortBbCredit          | 1.3.6.1.3.42.2.1.1.5.1.6  | 99   |
| fcFxpPortRxBufSize         | 1.3.6.1.3.42.2.1.1.5.1.7  | 99   |
| fcFxpPortRatov             | 1.3.6.1.3.42.2.1.1.5.1.8  | 99   |
| fcFxpPortEdtov             | 1.3.6.1.3.42.2.1.1.5.1.9  | 99   |
| fcFxpPortCosSupported      | 1.3.6.1.3.42.2.1.1.5.1.10 | 99   |
| fcFxpPortIntermixSupported | 1.3.6.1.3.42.2.1.1.5.1.11 | 99   |
| fcFxpPortStackedConnMode   | 1.3.6.1.3.42.2.1.1.5.1.12 | 99   |
| fcFxpPortClass2SeqDeliv    | 1.3.6.1.3.42.2.1.1.5.1.13 | 99   |
| fcFxpPortClass3SeqDeliv    | 1.3.6.1.3.42.2.1.1.5.1.14 | 99   |
| fcFxpPortHoldTime          | 1.3.6.1.3.42.2.1.1.5.1.15 | 99   |
| fcFxpPortBaudRate          | 1.3.6.1.3.42.2.1.1.5.1.16 | 99   |
| fcFxpPortMedium            | 1.3.6.1.3.42.2.1.1.5.1.17 | 99   |
| fcFxpPortTxType            | 1.3.6.1.3.42.2.1.1.5.1.18 | 99   |
| fcFxpPortDistance          | 1.3.6.1.3.42.2.1.1.5.1.19 | 99   |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name               | OID                       | Page |
|-------------------------------|---------------------------|------|
| fcFeOp                        | 1.3.6.1.3.42.2.1.2        | 99   |
| fcFxPortOperTable             | 1.3.6.1.3.42.2.1.2.1      | 99   |
| fcFxPortOperEntry             | 1.3.6.1.3.42.2.1.2.1.1    | 99   |
| fcFxPortOperModuleIndex       | 1.3.6.1.3.42.2.1.2.1.1.1  | 99   |
| fcFxPortOperFxPortIndex       | 1.3.6.1.3.42.2.1.2.1.1.2  | 99   |
| fcFxPortID                    | 1.3.6.1.3.42.2.1.2.1.1.3  | 99   |
| fcFxPortAttachedPortName      | 1.3.6.1.3.42.2.1.2.1.1.4  | 99   |
| fcFxPortConnectedPort         | 1.3.6.1.3.42.2.1.2.1.1.5  | 99   |
| fcFxPortBbCreditAvailable     | 1.3.6.1.3.42.2.1.2.1.1.6  | 99   |
| fcFxPortOperMode              | 1.3.6.1.3.42.2.1.2.1.1.7  | 99   |
| fcFxPortAdminMode             | 1.3.6.1.3.42.2.1.2.1.1.8  | 99   |
| fcFxPortPhysTable             | 1.3.6.1.3.42.2.1.2.3      | 99   |
| fcFxPortPhysEntry             | 1.3.6.1.3.42.2.1.2.3.1    | 99   |
| fcFxPortPhysModuleIndex       | 1.3.6.1.3.42.2.1.2.3.1.1  | 99   |
| fcFxPortPhysFxPortIndex       | 1.3.6.1.3.42.2.1.2.3.1.2  | 99   |
| fcFxPortPhysAdminStatus       | 1.3.6.1.3.42.2.1.2.3.1.3  | 99   |
| fcFxPortPhysOperStatus        | 1.3.6.1.3.42.2.1.2.3.1.4  | 99   |
| fcFxPortPhysLastChange        | 1.3.6.1.3.42.2.1.2.3.1.5  | 99   |
| fcFxPortPhysRttov             | 1.3.6.1.3.42.2.1.2.3.1.6  | 99   |
| fcFxlogiTable                 | 1.3.6.1.3.42.2.1.2.4      | 99   |
| fcFxlogiEntry                 | 1.3.6.1.3.42.2.1.2.4.1    | 99   |
| fcFxlogiModuleIndex           | 1.3.6.1.3.42.2.1.2.4.1.1  | 99   |
| fcFxlogiFxPortIndex           | 1.3.6.1.3.42.2.1.2.4.1.2  | 99   |
| fcFxlogiNxPortIndex           | 1.3.6.1.3.42.2.1.2.4.1.3  | 99   |
| fcFxPortFcphVersionAgreed     | 1.3.6.1.3.42.2.1.2.4.1.4  | 99   |
| fcFxPortNxPortBbCredit        | 1.3.6.1.3.42.2.1.2.4.1.5  | 99   |
| fcFxPortNxPortRxDataFieldSize | 1.3.6.1.3.42.2.1.2.4.1.6  | 99   |
| fcFxPortCosSuppAgreed         | 1.3.6.1.3.42.2.1.2.4.1.7  | 99   |
| fcFxPortIntermixSuppAgreed    | 1.3.6.1.3.42.2.1.2.4.1.8  | 99   |
| fcFxPortStackedConnModeAgreed | 1.3.6.1.3.42.2.1.2.4.1.9  | 99   |
| fcFxPortClass2SeqDelivAgreed  | 1.3.6.1.3.42.2.1.2.4.1.10 | 99   |
| fcFxPortClass3SeqDelivAgreed  | 1.3.6.1.3.42.2.1.2.4.1.11 | 99   |
| fcFxPortNxPortName            | 1.3.6.1.3.42.2.1.2.4.1.12 | 99   |
| fcFxPortConnectedNxPort       | 1.3.6.1.3.42.2.1.2.4.1.13 | 99   |
| fcFxPortBbCreditModel         | 1.3.6.1.3.42.2.1.2.4.1.14 | 99   |
| fcFeError                     | 1.3.6.1.3.42.2.1.3        | 100  |
| fcFxPortErrorTable            | 1.3.6.1.3.42.2.1.3.1      | 100  |
| fcFxPortErrorEntry            | 1.3.6.1.3.42.2.1.3.1.1    | 100  |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name                | OID                       | Page |
|--------------------------------|---------------------------|------|
| fcFxpPortErrorModuleIndex      | 1.3.6.1.3.42.2.1.3.1.1.1  | 100  |
| fcFxpPortErrorFxpPortIndex     | 1.3.6.1.3.42.2.1.3.1.1.2  | 100  |
| fcFxpPortLinkFailures          | 1.3.6.1.3.42.2.1.3.1.1.3  | 100  |
| fcFxpPortSyncLosses            | 1.3.6.1.3.42.2.1.3.1.1.4  | 100  |
| fcFxpPortSigLosses             | 1.3.6.1.3.42.2.1.3.1.1.5  | 100  |
| fcFxpPortPrimSeqProtoErrors    | 1.3.6.1.3.42.2.1.3.1.1.6  | 100  |
| fcFxpPortInvalidTxWords        | 1.3.6.1.3.42.2.1.3.1.1.7  | 100  |
| fcFxpPortInvalidCrcs           | 1.3.6.1.3.42.2.1.3.1.1.8  | 100  |
| fcFxpPortDelimiterErrors       | 1.3.6.1.3.42.2.1.3.1.1.9  | 100  |
| fcFxpPortAddressIdErrors       | 1.3.6.1.3.42.2.1.3.1.1.10 | 100  |
| fcFxpPortLinkResetIns          | 1.3.6.1.3.42.2.1.3.1.1.11 | 100  |
| fcFxpPortLinkResetOuts         | 1.3.6.1.3.42.2.1.3.1.1.12 | 100  |
| fcFxpPortOlsIns                | 1.3.6.1.3.42.2.1.3.1.1.13 | 100  |
| fcFxpPortOlsOuts               | 1.3.6.1.3.42.2.1.3.1.1.14 | 100  |
| fcFeAcct                       | 1.3.6.1.3.42.2.1.4        | 100  |
| fcFeCap                        | 1.3.6.1.3.42.2.1.5        | 100  |
| fcFxpPortCapTable              | 1.3.6.1.3.42.2.1.5.1      | 100  |
| fcFxpPortCapEntry              | 1.3.6.1.3.42.2.1.5.1.1    | 100  |
| fcFxpPortCapModuleIndex        | 1.3.6.1.3.42.2.1.5.1.1.1  | 100  |
| fcFxpPortCapFxpPortIndex       | 1.3.6.1.3.42.2.1.5.1.1.2  | 100  |
| fcFxpPortCapFcphVersionHigh    | 1.3.6.1.3.42.2.1.5.1.1.3  | 100  |
| fcFxpPortCapFcphVersionLow     | 1.3.6.1.3.42.2.1.5.1.1.4  | 100  |
| fcFxpPortCapBbCreditMax        | 1.3.6.1.3.42.2.1.5.1.1.5  | 100  |
| fcFxpPortCapBbCreditMin        | 1.3.6.1.3.42.2.1.5.1.1.6  | 100  |
| fcFxpPortCapRxDataFieldSizeMax | 1.3.6.1.3.42.2.1.5.1.1.7  | 100  |
| fcFxpPortCapRxDataFieldSizeMin | 1.3.6.1.3.42.2.1.5.1.1.8  | 100  |
| fcFxpPortCapCos                | 1.3.6.1.3.42.2.1.5.1.1.9  | 100  |
| fcFxpPortCapIntermix           | 1.3.6.1.3.42.2.1.5.1.1.10 | 100  |
| fcFxpPortCapStackedConnMode    | 1.3.6.1.3.42.2.1.5.1.1.11 | 100  |
| fcFxpPortCapClass2SeqDeliv     | 1.3.6.1.3.42.2.1.5.1.1.12 | 100  |
| fcFxpPortCapClass3SeqDeliv     | 1.3.6.1.3.42.2.1.5.1.1.13 | 100  |
| fcFxpPortCapHoldTimeMax        | 1.3.6.1.3.42.2.1.5.1.1.14 | 100  |
| fcFxpPortCapHoldTimeMin        | 1.3.6.1.3.42.2.1.5.1.1.15 | 100  |
| fcFxpPortCapBaudRates          | 1.3.6.1.3.42.2.1.5.1.1.16 | 100  |
| fcFxpPortCapMedia              | 1.3.6.1.3.42.2.1.5.1.1.17 | 100  |
| fcmgmt                         | 1.3.6.1.3.94              | 205  |
| connSet                        | 1.3.6.1.3.94.1            | 205  |
| uNumber                        | 1.3.6.1.3.94.1.1          | 205  |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name                 | OID                   | Page |
|---------------------------------|-----------------------|------|
| systemURL                       | 1.3.6.1.3.94.1.2      | 205  |
| connUnitTable                   | 1.3.6.1.3.94.1.6      | 205  |
| connUnitEntry                   | 1.3.6.1.3.94.1.6.1    | 206  |
| connUnitId                      | 1.3.6.1.3.94.1.6.1.1  | 206  |
| connUnitGlobalId                | 1.3.6.1.3.94.1.6.1.2  | 206  |
| connUnitType                    | 1.3.6.1.3.94.1.6.1.3  | 206  |
| connUnitNumports                | 1.3.6.1.3.94.1.6.1.4  | 206  |
| connUnitState                   | 1.3.6.1.3.94.1.6.1.5  | 206  |
| connUnitStatus                  | 1.3.6.1.3.94.1.6.1.6  | 206  |
| connUnitProduct                 | 1.3.6.1.3.94.1.6.1.7  | 206  |
| connUnitSn                      | 1.3.6.1.3.94.1.6.1.8  | 206  |
| connUnitUpTime                  | 1.3.6.1.3.94.1.6.1.9  | 206  |
| connUnitUrl                     | 1.3.6.1.3.94.1.6.1.10 | 206  |
| connUnitDomainId                | 1.3.6.1.3.94.1.6.1.11 | 206  |
| connUnitProxyMaster             | 1.3.6.1.3.94.1.6.1.12 | 206  |
| connUnitPrincipal               | 1.3.6.1.3.94.1.6.1.13 | 206  |
| connUnitNumSensors              | 1.3.6.1.3.94.1.6.1.14 | 206  |
| connUnitStatusChangeTime        | 1.3.6.1.3.94.1.6.1.15 | 206  |
| connUnitConfigurationChangeTime | 1.3.6.1.3.94.1.6.1.16 | 206  |
| connUnitNumRevs                 | 1.3.6.1.3.94.1.6.1.17 | 206  |
| connUnitNumZones                | 1.3.6.1.3.94.1.6.1.18 | 206  |
| connUnitModuleId                | 1.3.6.1.3.94.1.6.1.19 | 206  |
| connUnitName                    | 1.3.6.1.3.94.1.6.1.20 | 206  |
| connUnitInfo                    | 1.3.6.1.3.94.1.6.1.21 | 206  |
| connUnitControl                 | 1.3.6.1.3.94.1.6.1.22 | 206  |
| connUnitContact                 | 1.3.6.1.3.94.1.6.1.23 | 206  |
| connUnitLocation                | 1.3.6.1.3.94.1.6.1.24 | 206  |
| connUnitEventFilter             | 1.3.6.1.3.94.1.6.1.25 | 206  |
| connUnitNumEvents               | 1.3.6.1.3.94.1.6.1.26 | 206  |
| connUnitMaxEvents               | 1.3.6.1.3.94.1.6.1.27 | 206  |
| connUnitEventCurId              | 1.3.6.1.3.94.1.6.1.28 | 206  |
| connUnitRevsTable               | 1.3.6.1.3.94.1.7      | 206  |
| connUnitRevsEntry               | 1.3.6.1.3.94.1.7.1    | 206  |
| connUnitRevsUnitId              | 1.3.6.1.3.94.1.7.1.1  | 206  |
| connUnitRevsIndex               | 1.3.6.1.3.94.1.7.1.2  | 206  |
| connUnitRevsRevId               | 1.3.6.1.3.94.1.7.1.3  | 206  |
| connUnitRevsDescription         | 1.3.6.1.3.94.1.7.1.4  | 206  |
| connUnitSensorTable             | 1.3.6.1.3.94.1.8      | 206  |



**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name              | OID                    | Page |
|------------------------------|------------------------|------|
| connUnitSensorEntry          | 1.3.6.1.3.94.1.8.1     | 206  |
| connUnitSensorUnitId         | 1.3.6.1.3.94.1.8.1.1   | 206  |
| connUnitSensorIndex          | 1.3.6.1.3.94.1.8.1.2   | 206  |
| connUnitSensorName           | 1.3.6.1.3.94.1.8.1.3   | 206  |
| connUnitSensorStatus         | 1.3.6.1.3.94.1.8.1.4   | 206  |
| connUnitSensorInfo           | 1.3.6.1.3.94.1.8.1.5   | 206  |
| connUnitSensorMessage        | 1.3.6.1.3.94.1.8.1.6   | 206  |
| connUnitSensorType           | 1.3.6.1.3.94.1.8.1.7   | 206  |
| connUnitSensorCharacteristic | 1.3.6.1.3.94.1.8.1.8   | 206  |
| connUnitPortTable            | 1.3.6.1.3.94.1.10      | 206  |
| connUnitPortEntry            | 1.3.6.1.3.94.1.10.1    | 206  |
| connUnitPortUnitId           | 1.3.6.1.3.94.1.10.1.1  | 206  |
| connUnitPortIndex            | 1.3.6.1.3.94.1.10.1.2  | 206  |
| connUnitPortType             | 1.3.6.1.3.94.1.10.1.3  | 206  |
| connUnitPortFCClassCap       | 1.3.6.1.3.94.1.10.1.4  | 206  |
| connUnitPortFCClassOp        | 1.3.6.1.3.94.1.10.1.5  | 206  |
| connUnitPortState            | 1.3.6.1.3.94.1.10.1.6  | 206  |
| connUnitPortStatus           | 1.3.6.1.3.94.1.10.1.7  | 206  |
| connUnitPortTransmitterType  | 1.3.6.1.3.94.1.10.1.8  | 206  |
| connUnitPortModuleType       | 1.3.6.1.3.94.1.10.1.9  | 206  |
| connUnitPortWwn              | 1.3.6.1.3.94.1.10.1.10 | 206  |
| connUnitPortFCId             | 1.3.6.1.3.94.1.10.1.11 | 206  |
| connUnitPortSn               | 1.3.6.1.3.94.1.10.1.12 | 206  |
| connUnitPortRevision         | 1.3.6.1.3.94.1.10.1.13 | 206  |
| connUnitPortVendor           | 1.3.6.1.3.94.1.10.1.14 | 206  |
| connUnitPortSpeed            | 1.3.6.1.3.94.1.10.1.15 | 206  |
| connUnitPortControl          | 1.3.6.1.3.94.1.10.1.16 | 206  |
| connUnitPortName             | 1.3.6.1.3.94.1.10.1.17 | 206  |
| connUnitPortPhysicalNumber   | 1.3.6.1.3.94.1.10.1.18 | 206  |
| connUnitPortStatObject       | 1.3.6.1.3.94.1.10.1.19 | 206  |
| connUnitPortProtocolCap      | 1.3.6.1.3.94.1.10.1.20 | 206  |
| connUnitPortProtocolOp       | 1.3.6.1.3.94.1.10.1.21 | 206  |
| connUnitPortNodeWwn          | 1.3.6.1.3.94.1.10.1.22 | 206  |
| connUnitPortHWState          | 1.3.6.1.3.94.1.10.1.23 | 206  |
| connUnitEventTable           | 1.3.6.1.3.94.1.11      | 206  |
| connUnitEventEntry           | 1.3.6.1.3.94.1.11.1    | 206  |
| connUnitEventUnitId          | 1.3.6.1.3.94.1.11.1.1  | 206  |
| connUnitEventIndex           | 1.3.6.1.3.94.1.11.1.2  | 206  |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name               | OID                    | Page |
|-------------------------------|------------------------|------|
| connUnitEventId               | 1.3.6.1.3.94.1.11.1.3  | 206  |
| connUnitREventTime            | 1.3.6.1.3.94.1.11.1.4  | 206  |
| connUnitSEventTime            | 1.3.6.1.3.94.1.11.1.5  | 206  |
| connUnitEventSeverity         | 1.3.6.1.3.94.1.11.1.6  | 206  |
| connUnitEventType             | 1.3.6.1.3.94.1.11.1.7  | 206  |
| connUnitEventObject           | 1.3.6.1.3.94.1.11.1.8  | 206  |
| connUnitEventDescr            | 1.3.6.1.3.94.1.11.1.9  | 206  |
| connUnitLinkTable             | 1.3.6.1.3.94.1.12      | 206  |
| connUnitLinkEntry             | 1.3.6.1.3.94.1.12.1    | 206  |
| connUnitLinkUnitId            | 1.3.6.1.3.94.1.12.1.1  | 206  |
| connUnitLinkIndex             | 1.3.6.1.3.94.1.12.1.2  | 206  |
| connUnitLinkNodeIdX           | 1.3.6.1.3.94.1.12.1.3  | 206  |
| connUnitLinkPortNumberX       | 1.3.6.1.3.94.1.12.1.4  | 206  |
| connUnitLinkPortWwnX          | 1.3.6.1.3.94.1.12.1.5  | 206  |
| connUnitLinkNodeIdY           | 1.3.6.1.3.94.1.12.1.6  | 206  |
| connUnitLinkPortNumberY       | 1.3.6.1.3.94.1.12.1.7  | 206  |
| connUnitLinkPortWwnY          | 1.3.6.1.3.94.1.12.1.8  | 206  |
| connUnitLinkAgentAddressY     | 1.3.6.1.3.94.1.12.1.9  | 206  |
| connUnitLinkAgentAddressTypeY | 1.3.6.1.3.94.1.12.1.10 | 206  |
| connUnitLinkAgentPortY        | 1.3.6.1.3.94.1.12.1.11 | 206  |
| connUnitLinkUnitTypeY         | 1.3.6.1.3.94.1.12.1.12 | 206  |
| connUnitLinkConnIdY           | 1.3.6.1.3.94.1.12.1.13 | 206  |
| connUnitLinkCurrIndex         | 1.3.6.1.3.94.1.12.1.14 | 206  |
| trapReg                       | 1.3.6.1.3.94.2         | 205  |
| trapMaxClients                | 1.3.6.1.3.94.2.1       | 205  |
| trapClientCount               | 1.3.6.1.3.94.2.2       | 205  |
| trapRegTable                  | 1.3.6.1.3.94.2.3       | 207  |
| trapRegEntry                  | 1.3.6.1.3.94.2.3.1     | 207  |
| trapRegIpAddress              | 1.3.6.1.3.94.2.3.1.1   | 207  |
| trapRegPort                   | 1.3.6.1.3.94.2.3.1.2   | 207  |
| trapRegFilter                 | 1.3.6.1.3.94.2.3.1.3   | 207  |
| trapRegRowState               | 1.3.6.1.3.94.2.3.1.4   | 207  |
| revisionNumber                | 1.3.6.1.3.94.3         | 205  |
| statSet                       | 1.3.6.1.3.94.4         | 205  |
| connUnitPortStatTable         | 1.3.6.1.3.94.4.5       | 207  |
| connUnitPortStatEntry         | 1.3.6.1.3.94.4.5.1     | 207  |
| connUnitPortStatUnitId        | 1.3.6.1.3.94.4.5.1.1   | 207  |
| connUnitPortStatIndex         | 1.3.6.1.3.94.4.5.1.2   | 207  |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name                              | OID                   | Page                |
|--|-----------------------|---------------------|
| connUnitPortStatCountError                   | 1.3.6.1.3.94.4.5.1.3  | <a href="#">207</a> |
| connUnitPortStatCountTxObjects               | 1.3.6.1.3.94.4.5.1.4  | <a href="#">207</a> |
| connUnitPortStatCountRxObjects               | 1.3.6.1.3.94.4.5.1.5  | <a href="#">207</a> |
| connUnitPortStatCountTxElements              | 1.3.6.1.3.94.4.5.1.6  | <a href="#">207</a> |
| connUnitPortStatCountRxElements              | 1.3.6.1.3.94.4.5.1.7  | <a href="#">207</a> |
| connUnitPortStatCountBBCreditZero            | 1.3.6.1.3.94.4.5.1.8  | <a href="#">207</a> |
| connUnitPortStatCountInputBuffersFull        | 1.3.6.1.3.94.4.5.1.9  | <a href="#">207</a> |
| connUnitPortStatCountFBSYFrames              | 1.3.6.1.3.94.4.5.1.10 | <a href="#">207</a> |
| connUnitPortStatCountPBSYFrames              | 1.3.6.1.3.94.4.5.1.11 | <a href="#">207</a> |
| connUnitPortStatCountFRJTFrames              | 1.3.6.1.3.94.4.5.1.12 | <a href="#">207</a> |
| connUnitPortStatCountPRJTFrames              | 1.3.6.1.3.94.4.5.1.13 | <a href="#">207</a> |
| connUnitPortStatCountClass1RxFrames          | 1.3.6.1.3.94.4.5.1.14 | <a href="#">207</a> |
| connUnitPortStatCountClass1TxFrames          | 1.3.6.1.3.94.4.5.1.15 | <a href="#">207</a> |
| connUnitPortStatCountClass1FBSYFrames        | 1.3.6.1.3.94.4.5.1.16 | <a href="#">207</a> |
| connUnitPortStatCountClass1PBSYFrames        | 1.3.6.1.3.94.4.5.1.17 | <a href="#">207</a> |
| connUnitPortStatCountClass1FRJTFrames        | 1.3.6.1.3.94.4.5.1.18 | <a href="#">207</a> |
| connUnitPortStatCountClass1PRJTFrames        | 1.3.6.1.3.94.4.5.1.19 | <a href="#">207</a> |
| connUnitPortStatCountClass2RxFrames          | 1.3.6.1.3.94.4.5.1.20 | <a href="#">207</a> |
| connUnitPortStatCountClass2TxFrames          | 1.3.6.1.3.94.4.5.1.21 | <a href="#">207</a> |
| connUnitPortStatCountClass2FBSYFrames        | 1.3.6.1.3.94.4.5.1.22 | <a href="#">207</a> |
| connUnitPortStatCountClass2PBSYFrames        | 1.3.6.1.3.94.4.5.1.23 | <a href="#">207</a> |
| connUnitPortStatCountClass2FRJTFrames        | 1.3.6.1.3.94.4.5.1.24 | <a href="#">207</a> |
| connUnitPortStatCountClass2PRJTFrames        | 1.3.6.1.3.94.4.5.1.25 | <a href="#">207</a> |
| connUnitPortStatCountClass3RxFrames          | 1.3.6.1.3.94.4.5.1.26 | <a href="#">207</a> |
| connUnitPortStatCountClass3TxFrames          | 1.3.6.1.3.94.4.5.1.27 | <a href="#">207</a> |
| connUnitPortStatCountClass3Discards          | 1.3.6.1.3.94.4.5.1.28 | <a href="#">207</a> |
| connUnitPortStatCountRxMulticastObjects      | 1.3.6.1.3.94.4.5.1.29 | <a href="#">207</a> |
| connUnitPortStatCountTxMulticastObjects      | 1.3.6.1.3.94.4.5.1.30 | <a href="#">207</a> |
| connUnitPortStatCountRxBroadcastObjects      | 1.3.6.1.3.94.4.5.1.31 | <a href="#">207</a> |
| connUnitPortStatCountTxBroadcastObjects      | 1.3.6.1.3.94.4.5.1.32 | <a href="#">207</a> |
| connUnitPortStatCountRxLinkResets            | 1.3.6.1.3.94.4.5.1.33 | <a href="#">207</a> |
| connUnitPortStatCountTxLinkResets            | 1.3.6.1.3.94.4.5.1.34 | <a href="#">207</a> |
| connUnitPortStatCountNumberLinkResets        | 1.3.6.1.3.94.4.5.1.35 | <a href="#">207</a> |
| connUnitPortStatCountRxOfflineSequences      | 1.3.6.1.3.94.4.5.1.36 | <a href="#">207</a> |
| connUnitPortStatCountTxOfflineSequences      | 1.3.6.1.3.94.4.5.1.37 | <a href="#">207</a> |
| connUnitPortStatCountNumberOffline Sequences | 1.3.6.1.3.94.4.5.1.38 | <a href="#">207</a> |
| connUnitPortStatCountLinkFailures            | 1.3.6.1.3.94.4.5.1.39 | <a href="#">207</a> |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name  | OID                     | Page                |
|--|-------------------------|---------------------|
| connUnitPortStatCountInvalidCRC                          | 1.3.6.1.3.94.4.5.1.40   | <a href="#">207</a> |
| connUnitPortStatCountInvalidTxWords                      | 1.3.6.1.3.94.4.5.1.41   | <a href="#">207</a> |
| connUnitPortStatCountPrimitiveSequence<br>ProtocolErrors | 1.3.6.1.3.94.4.5.1.42   | <a href="#">207</a> |
| connUnitPortStatCountLossofSignal                        | 1.3.6.1.3.94.4.5.1.43   | <a href="#">207</a> |
| connUnitPortStatCountLossofSynchronization               | 1.3.6.1.3.94.4.5.1.44   | <a href="#">207</a> |
| connUnitPortStatCountInvalidOrderedSets                  | 1.3.6.1.3.94.4.5.1.45   | <a href="#">207</a> |
| connUnitPortStatCountFramesTooLong                       | 1.3.6.1.3.94.4.5.1.46   | <a href="#">207</a> |
| connUnitPortStatCountFramesTruncated                     | 1.3.6.1.3.94.4.5.1.47   | <a href="#">207</a> |
| connUnitPortStatCountAddressErrors                       | 1.3.6.1.3.94.4.5.1.48   | <a href="#">207</a> |
| connUnitPortStatCountDelimiterErrors                     | 1.3.6.1.3.94.4.5.1.49   | <a href="#">207</a> |
| connUnitPortStatCountEncodingDisparityErrors             | 1.3.6.1.3.94.4.5.1.50   | <a href="#">207</a> |
| connUnitServiceSet                                       | 1.3.6.1.3.94.5          | <a href="#">205</a> |
| connUnitServiceScalars                                   | 1.3.6.1.3.94.5.1        | <a href="#">205</a> |
| connUnitSnsMaxEntry                                      | 1.3.6.1.3.94.5.1.1      | <a href="#">205</a> |
| connUnitServiceTables                                    | 1.3.6.1.3.94.5.2        | <a href="#">205</a> |
| connUnitSnsTable   | 1.3.6.1.3.94.5.2.1      | <a href="#">207</a> |
| connUnitSnsEntry   | 1.3.6.1.3.94.5.2.1.1    | <a href="#">207</a> |
| connUnitSnsId  | 1.3.6.1.3.94.5.2.1.1.1  | <a href="#">207</a> |
| connUnitSnsPortIndex                                     | 1.3.6.1.3.94.5.2.1.1.2  | <a href="#">207</a> |
| connUnitSnsPortIdentifier                                | 1.3.6.1.3.94.5.2.1.1.3  | <a href="#">207</a> |
| connUnitSnsPortName                                      | 1.3.6.1.3.94.5.2.1.1.4  | <a href="#">207</a> |
| connUnitSnsNodeName                                      | 1.3.6.1.3.94.5.2.1.1.5  | <a href="#">207</a> |
| connUnitSnsClassOfSvc                                    | 1.3.6.1.3.94.5.2.1.1.6  | <a href="#">207</a> |
| connUnitSnsNodeIPAddress                                 | 1.3.6.1.3.94.5.2.1.1.7  | <a href="#">207</a> |
| connUnitSnsProcAssoc                                     | 1.3.6.1.3.94.5.2.1.1.8  | <a href="#">207</a> |
| connUnitSnsFC4Type                                       | 1.3.6.1.3.94.5.2.1.1.9  | <a href="#">207</a> |
| connUnitSnsPortType                                      | 1.3.6.1.3.94.5.2.1.1.10 | <a href="#">207</a> |
| connUnitSnsPortIPAddress                                 | 1.3.6.1.3.94.5.2.1.1.11 | <a href="#">207</a> |
| connUnitSnsFabricPortName                                | 1.3.6.1.3.94.5.2.1.1.12 | <a href="#">207</a> |
| connUnitSnsHardAddress                                   | 1.3.6.1.3.94.5.2.1.1.13 | <a href="#">207</a> |
| connUnitSnsSymbolicPortName                              | 1.3.6.1.3.94.5.2.1.1.14 | <a href="#">207</a> |
| connUnitSnsSymbolicNodeName                              | 1.3.6.1.3.94.5.2.1.1.15 | <a href="#">207</a> |
| private  | 1.3.6.1.4               | <a href="#">144</a> |
| enterprises  | 1.3.6.1.4.1             | <a href="#">144</a> |
| bcsi   | 1.3.6.1.4.1.1588        | <a href="#">144</a> |
| commDev  | 1.3.6.1.4.1.1588.2      | <a href="#">144</a> |
| fibrechannel   | 1.3.6.1.4.1.1588.2.1    | <a href="#">144</a> |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name        | OID                               | Page                |
|------------------------|-----------------------------------|---------------------|
| fcSwitch               | 1.3.6.1.4.1.1588.2.1.1            | <a href="#">144</a> |
| sw                     | 1.3.6.1.4.1.1588.2.1.1.1          | <a href="#">144</a> |
| swSystem               | 1.3.6.1.4.1.1588.2.1.1.1.1        | <a href="#">144</a> |
| swCurrentDate          | 1.3.6.1.4.1.1588.2.1.1.1.1.1      | <a href="#">145</a> |
| swBootDate             | 1.3.6.1.4.1.1588.2.1.1.1.1.2      | <a href="#">145</a> |
| swFWLastUpdated        | 1.3.6.1.4.1.1588.2.1.1.1.1.3      | <a href="#">145</a> |
| swFlashLastUpdated     | 1.3.6.1.4.1.1588.2.1.1.1.1.4      | <a href="#">145</a> |
| swBootPromLastUpdated  | 1.3.6.1.4.1.1588.2.1.1.1.1.5      | <a href="#">145</a> |
| swFirmwareVersion      | 1.3.6.1.4.1.1588.2.1.1.1.1.6      | <a href="#">145</a> |
| swOperStatus           | 1.3.6.1.4.1.1588.2.1.1.1.1.7      | <a href="#">145</a> |
| swAdmStatus            | 1.3.6.1.4.1.1588.2.1.1.1.1.8      | <a href="#">145</a> |
| swTelnetShellAdmStatus | 1.3.6.1.4.1.1588.2.1.1.1.1.9      | <a href="#">145</a> |
| swSsn                  | 1.3.6.1.4.1.1588.2.1.1.1.1.10     | <a href="#">145</a> |
| swFlashDLOperStatus    | 1.3.6.1.4.1.1588.2.1.1.1.1.11     | <a href="#">145</a> |
| swFlashDLAdmStatus     | 1.3.6.1.4.1.1588.2.1.1.1.1.12     | <a href="#">145</a> |
| swFlashDLHost          | 1.3.6.1.4.1.1588.2.1.1.1.1.13     | <a href="#">145</a> |
| swFlashDLUser          | 1.3.6.1.4.1.1588.2.1.1.1.1.14     | <a href="#">145</a> |
| swFlashDLFile          | 1.3.6.1.4.1.1588.2.1.1.1.1.15     | <a href="#">145</a> |
| swFlashDLPassword      | 1.3.6.1.4.1.1588.2.1.1.1.1.16     | <a href="#">145</a> |
| swBeaconOperStatus     | 1.3.6.1.4.1.1588.2.1.1.1.1.18     | <a href="#">145</a> |
| swBeaconAdmStatus      | 1.3.6.1.4.1.1588.2.1.1.1.1.19     | <a href="#">145</a> |
| swDiagResult           | 1.3.6.1.4.1.1588.2.1.1.1.1.20     | <a href="#">145</a> |
| swNumSensors           | 1.3.6.1.4.1.1588.2.1.1.1.1.21     | <a href="#">145</a> |
| swSensorTable          | 1.3.6.1.4.1.1588.2.1.1.1.1.22     | <a href="#">145</a> |
| swSensorEntry          | 1.3.6.1.4.1.1588.2.1.1.1.1.22.1   | <a href="#">145</a> |
| swSensorIndex          | 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.1 | <a href="#">145</a> |
| swSensorType           | 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.2 | <a href="#">145</a> |
| swSensorStatus         | 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.3 | <a href="#">145</a> |
| swSensorValue          | 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.4 | <a href="#">145</a> |
| swSensorInfo           | 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.5 | <a href="#">145</a> |
| swTrackChangesInfo     | 1.3.6.1.4.1.1588.2.1.1.1.1.23     | <a href="#">145</a> |
| swFabric               | 1.3.6.1.4.1.1588.2.1.1.1.2        | <a href="#">145</a> |
| swDomainID             | 1.3.6.1.4.1.1588.2.1.1.1.2.1      | <a href="#">145</a> |
| swPrincipalSwitch      | 1.3.6.1.4.1.1588.2.1.1.1.2.2      | <a href="#">145</a> |
| swNumNbs               | 1.3.6.1.4.1.1588.2.1.1.1.2.8      | <a href="#">145</a> |
| swNbTable              | 1.3.6.1.4.1.1588.2.1.1.1.2.9      | <a href="#">145</a> |
| swNbEntry              | 1.3.6.1.4.1.1588.2.1.1.1.2.9.1    | <a href="#">145</a> |
| swNbIndex              | 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.1  | <a href="#">145</a> |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name     | OID                               | Page                |
|---------------------|-----------------------------------|---------------------|
| swNbMyPort          | 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.2  | <a href="#">145</a> |
| swNbRemDomain       | 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.3  | <a href="#">145</a> |
| swNbRemPort         | 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.4  | <a href="#">145</a> |
| swNbBaudRate        | 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.5  | <a href="#">145</a> |
| swNbIsIState        | 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.6  | <a href="#">145</a> |
| swNbIsICost         | 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.7  | <a href="#">145</a> |
| swNbRemPortName     | 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.8  | <a href="#">145</a> |
| swModule            | 1.3.6.1.4.1.1588.2.1.1.1.3        | <a href="#">145</a> |
| swAgtCfg            | 1.3.6.1.4.1.1588.2.1.1.1.4        | <a href="#">145</a> |
| swAgtCmtyTable      | 1.3.6.1.4.1.1588.2.1.1.1.4.11     | <a href="#">145</a> |
| swAgtCmtyEntry      | 1.3.6.1.4.1.1588.2.1.1.1.4.11.1   | <a href="#">145</a> |
| swAgtCmtyIdx        | 1.3.6.1.4.1.1588.2.1.1.1.4.11.1.1 | <a href="#">145</a> |
| swAgtCmtyStr        | 1.3.6.1.4.1.1588.2.1.1.1.4.11.1.2 | <a href="#">145</a> |
| swAgtTrapRcp        | 1.3.6.1.4.1.1588.2.1.1.1.4.11.1.3 | <a href="#">145</a> |
| swFCport            | 1.3.6.1.4.1.1588.2.1.1.1.6        | <a href="#">146</a> |
| swFCPortCapacity    | 1.3.6.1.4.1.1588.2.1.1.1.6.1      | <a href="#">146</a> |
| swFCPortTable       | 1.3.6.1.4.1.1588.2.1.1.1.6.2      | <a href="#">146</a> |
| swFCPortEntry       | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1    | <a href="#">146</a> |
| swFCPortIndex       | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.1  | <a href="#">146</a> |
| swFCPortType        | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.2  | <a href="#">146</a> |
| swFCPortPhyState    | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.3  | <a href="#">146</a> |
| swFCPortOpStatus    | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.4  | <a href="#">146</a> |
| swFCPortAdmStatus   | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.5  | <a href="#">146</a> |
| swFCPortLinkState   | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.6  | <a href="#">146</a> |
| swFCPortTxType      | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.7  | <a href="#">146</a> |
| swFCPortTxWords     | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.11 | <a href="#">146</a> |
| swFCPortRxWords     | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.12 | <a href="#">146</a> |
| swFCPortTxFrames    | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.13 | <a href="#">146</a> |
| swFCPortRxFrames    | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.14 | <a href="#">146</a> |
| swFCPortRxC2Frames  | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.15 | <a href="#">146</a> |
| swFCPortRxC3Frames  | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.16 | <a href="#">146</a> |
| swFCPortRxCs        | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.17 | <a href="#">146</a> |
| swFCPortRxCasts     | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.18 | <a href="#">146</a> |
| swFCPortTooManyRdys | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.19 | <a href="#">146</a> |
| swFCPortNoTxCredits | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.20 | <a href="#">146</a> |
| swFCPortRxEcnFrs    | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.21 | <a href="#">146</a> |
| swFCPortRxCrcs      | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.22 | <a href="#">146</a> |
| swFCPortRxTrunks    | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.23 | <a href="#">146</a> |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name        | OID                               | Page                |
|------------------------|-----------------------------------|---------------------|
| swFCPortRxTooLongs     | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.24 | <a href="#">146</a> |
| swFCPortRxBadEofs      | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.25 | <a href="#">146</a> |
| swFCPortRxEncOutFrs    | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.26 | <a href="#">146</a> |
| swFCPortRxBadOs        | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.27 | <a href="#">146</a> |
| swFCPortC3Discards     | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.28 | <a href="#">146</a> |
| swFCPortMcastTimedOuts | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.29 | <a href="#">146</a> |
| swFCPortTxMcasts       | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.30 | <a href="#">146</a> |
| swFCPortLipIns         | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.31 | <a href="#">146</a> |
| swFCPortLipOuts        | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.32 | <a href="#">146</a> |
| swFCPortLipLastAlpa    | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.33 | <a href="#">146</a> |
| swFCPortWwn            | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.34 | <a href="#">146</a> |
| swFCPortSpeed          | 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.35 | <a href="#">146</a> |
| swNs                   | 1.3.6.1.4.1.1588.2.1.1.1.7        | <a href="#">146</a> |
| swNsLocalNumEntry      | 1.3.6.1.4.1.1588.2.1.1.1.7.1      | <a href="#">146</a> |
| swNsLocalTable         | 1.3.6.1.4.1.1588.2.1.1.1.7.2      | <a href="#">146</a> |
| swNsLocalEntry         | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1    | <a href="#">146</a> |
| swNsEntryIndex         | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.1  | <a href="#">146</a> |
| swNsPortID             | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.2  | <a href="#">146</a> |
| swNsPortType           | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.3  | <a href="#">146</a> |
| swNsPortName           | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.4  | <a href="#">146</a> |
| swNsPortSymb           | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.5  | <a href="#">146</a> |
| swNsNodeName           | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.6  | <a href="#">146</a> |
| swNsNodeSymb           | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.7  | <a href="#">146</a> |
| swNsIP                 | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.8  | <a href="#">146</a> |
| swNsIpAddress          | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.9  | <a href="#">146</a> |
| swNsCos                | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.10 | <a href="#">146</a> |
| swNsFc4                | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.11 | <a href="#">146</a> |
| swNsIpNxPort           | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.12 | <a href="#">146</a> |
| swNsWwn                | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.13 | <a href="#">146</a> |
| swNsHardAddr           | 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.14 | <a href="#">146</a> |
| swEvent                | 1.3.6.1.4.1.1588.2.1.1.1.8        | <a href="#">146</a> |
| swEventTrapLevel       | 1.3.6.1.4.1.1588.2.1.1.1.8.1      | <a href="#">146</a> |
| swEventNumEntries      | 1.3.6.1.4.1.1588.2.1.1.1.8.4      | <a href="#">146</a> |
| swEventTable           | 1.3.6.1.4.1.1588.2.1.1.1.8.5      | <a href="#">146</a> |
| swEventEntry           | 1.3.6.1.4.1.1588.2.1.1.1.8.5.1    | <a href="#">146</a> |
| swEventIndex           | 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.1  | <a href="#">146</a> |
| swEventTimeInfo        | 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.2  | <a href="#">146</a> |
| swEventLevel           | 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.3  | <a href="#">146</a> |

**Table 16: MIB Object Name-OID Matrix (Continued)**

| MIB Object Name          | OID                                | Page                |
|--------------------------|------------------------------------|---------------------|
| swEventRepeatCount       | 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.4   | <a href="#">146</a> |
| swEventDescr             | 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.5   | <a href="#">146</a> |
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| swFwCustInBetweenActs    | 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.24 | <a href="#">147</a> |
| swFwValidActs            | 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.25 | <a href="#">147</a> |
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| swFwLastEvent          | 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.6  | <a href="#">147</a> |
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| swFwLastEventTime      | 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.8  | <a href="#">147</a> |
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| swFwBehaviorType       | 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.10 | <a href="#">147</a> |
| swFwBehaviorInt        | 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.11 | <a href="#">147</a> |
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| swEndDevicePortID      | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.3  | <a href="#">147</a> |
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| swEndDeviceSyncLoss    | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.5  | <a href="#">147</a> |
| swEndDeviceSigLoss     | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.6  | <a href="#">147</a> |
| swEndDeviceProtoErr    | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.7  | <a href="#">147</a> |
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| swEndDeviceInvalidCRC  | 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.9  | <a href="#">147</a> |
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| swBlmPerfAlpaPort      | 1.3.6.1.4.1.1588.2.1.1.1.23.1.1.1  | <a href="#">147</a> |
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| swBlmPerfAlpaCRCCnt    | 1.3.6.1.4.1.1588.2.1.1.1.23.1.1.4  | <a href="#">147</a> |
| swBlmPerfEEMntTable    | 1.3.6.1.4.1.1588.2.1.1.1.23.2      | <a href="#">147</a> |
| swBlmPerfEEMntEntry    | 1.3.6.1.4.1.1588.2.1.1.1.23.2.1    | <a href="#">147</a> |
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| swBlmPerfFltMntEntry    | 1.3.6.1.4.1.1588.2.1.1.1.23.3.1   | <a href="#">147</a> |
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| swBlmPerfFltCnt         | 1.3.6.1.4.1.1588.2.1.1.1.23.3.1.3 | <a href="#">147</a> |
| swBlmPerfFltAlias       | 1.3.6.1.4.1.1588.2.1.1.1.23.3.1.4 | <a href="#">147</a> |
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| swFabricMemDid          | 1.3.6.1.1.1588.2.1.1.1.2.10.1.2   | <a href="#">145</a> |
| swFabricMemName         | 1.3.6.1.1.1588.2.1.1.1.2.10.1.3   | <a href="#">145</a> |
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| swGroupName             | 1.3.6.1.4.1.1588.2.1.1.1.22.1.1.2 | <a href="#">187</a> |
| swGroupType             | 1.3.6.1.4.1.1588.2.1.1.1.22.1.1.3 | <a href="#">187</a> |
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| swGroupMemWwn           | 1.3.6.1.4.1.1588.2.1.1.1.22.2.1.2 | <a href="#">188</a> |
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**Table 16: MIB Object Name-OID Matrix (Continued)**

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| swTrunkPortIndex   | 1.3.6.1.4.1.1588.2.1.1.1.24.2.1.1 | <a href="#">148</a> |
| swTrunkGroupNumber | 1.3.6.1.4.1.1588.2.1.1.1.24.2.1.2 | <a href="#">148</a> |
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| swPortTrunked      | 1.3.6.1.4.1.1588.2.1.1.1.24.2.1.4 | <a href="#">148</a> |
| swTrunkGrpTable    | 1.3.6.1.4.1.1588.2.1.1.1.24.3     | <a href="#">148</a> |
| swTrunkGrpEntry    | 1.3.6.1.4.1.1588.2.1.1.1.24.3.1   | <a href="#">148</a> |
| swTrunkGrpNumber   | 1.3.6.1.4.1.1588.2.1.1.1.24.3.1.1 | <a href="#">148</a> |
| swTrunkGrpMaster   | 1.3.6.1.4.1.1588.2.1.1.1.24.3.1.2 | <a href="#">148</a> |
| swTrunkGrpTx       | 1.3.6.1.4.1.1588.2.1.1.1.24.3.1.3 | <a href="#">148</a> |
| swTrunkGrpRx       | 1.3.6.1.4.1.1588.2.1.1.1.24.3.1.4 | <a href="#">148</a> |
| sw28k              | 1.3.6.1.4.1.1588.2.1.1.2          | <a href="#">144</a> |
| sw21kN24k          | 1.3.6.1.4.1.1588.2.1.1.3          | <a href="#">144</a> |
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## glossary

This glossary defines terms used in this guide or related to this product and is not a comprehensive glossary of computer terms.

### **8b/10b encoding**

An encoding scheme that converts each 8-bit byte into 10 bits. Used to balance 1s and 0s in high-speed transports.

### **ABLS**

Abort Basic Link Service. Also called *Abort Sequence*.

### **ACC**

Accept link service reply. The normal reply to an Extended Link Service request (such as FLOGI), indicating that the request has been completed.

### **access fairness**

A process by which contending nodes are guaranteed access to an arbitrated loop.

### **ACK**

Acknowledgement frame, used for end-to-end flow control. Verifies receipt of one or more frames from Class 1, 2, or F services.

### **address identifier**

A 24-bit or 8-bit value used to identify the source or destination of a frame. *See also* S\_ID and D\_ID.

### **AL\_PA**

Arbitrated loop physical address. A unique 8-bit value assigned during loop initialization to a port in an arbitrated loop.

### **AL\_TIME**

Arbitrated loop timeout value. Twice the amount of time it would take for a transmission word to propagate around a worst-case loop. The default value is 15 milliseconds (ms).

### **alias**

A logical grouping of elements in a fabric. An alias is a collection of port numbers and connected devices, used to simplify the entry of port numbers and WWNs when creating zones.

### **alias address identifier**

An address identifier recognized by a port in addition to its standard identifier. An alias address identifier can be shared by multiple ports. *See also* [alias](#).

### **alias AL\_PA**

An AL\_PA value recognized by an L\_Port in addition to the AL\_PA assigned to the port. *See also* [AL\\_PA](#).

**alias server**

A fabric software facility that supports multicast group management.

**ANSI**

American National Standards Institute.

**ARB**

Arbitrative primitive signal. Applies only to an arbitrated-loop topology. Transmitted as the fill word by an L\_Port to indicate that the port is arbitrating access to the loop.

**arbitrated loop**

A shared 100-MB/sec Fibre Channel transport structured as a loop. Can support up to 126 devices and one fabric attachment. *See also* [topology](#).

**arbitration**

A method of gaining orderly access to a shared-loop topology.

**area number**

In Fabric OS v4.0 and above, ports on a switch are assigned a logical area number. Port area numbers can be viewed by entering the `switchShow` command. They are used to define the operative port for many Fabric OS commands: for example, area numbers can be used to define the ports within an alias or zone.

**ARP**

Address Resolution Protocol. A TCP/IP function for associating an IP address with a link-level address.

**ARR**

Asynchronous response router. Refers to Management Server GS\_Subtype Code E4, which appears in `portLogDump` command output.

**ASD**

Alias server daemon. Used for managing multicast groups by supporting the create, add, remove, and destroy functions.

**ASIC**

Application-specific integrated circuit.

**ATM**

Asynchronous Transfer Mode. A transport used for transmitting data over LANs or WANs that transmit fixed-length units of data. Provides any-to-any connectivity and allows nodes to transmit simultaneously.

**AW\_TOV**

Arbitration wait timeout value. The minimum time an arbitrating L\_Port waits for a response before beginning loop initialization.

**backup FCS switch**

Relates to the Secure Fabric OS feature. The backup fabric configuration server serves as a backup in case the primary FCS switch fails. *See also* [FCS switch](#), [primary FCS switch](#).

**bandwidth**

The total transmission capacity of a cable, link, or system. Usually measured in bps (bits per second). Can also refer to the range of transmission frequencies available to a link or system. *See also* [throughput](#).

**BB\_Credit**

Buffer-to-buffer credit. The number of frames that can be transmitted to a directly connected recipient or within an arbitrated loop. Determined by the number of receive buffers available. *See also* [buffer-to-buffer flow control](#), [EE\\_Credit](#).

**beacon**

A tool in which all of the port LEDs on a switch are set to flash from one side of the switch to the other, to enable identification of an individual switch in a large fabric. A switch can be set to beacon by a CLI command or through Advanced Web Tools.

**beginning running disparity**

The disparity at the transmitter or receiver when the special character associated with an ordered set is encoded or decoded. *See also* [disparity](#).

**BISR**

Built-in self-repair.

**BIST**

Built-in self-test.

**bit synchronization**

The condition in which a receiver is delivering retimed serial data at the required bit error rate.

**blind-mate connector**

A two-way connector used in some HP StorageWorks switches to provide a connection between the motherboard and the power supply.

**block**

As it applies to Fibre Channel technology, upper-level application data that is transferred in a single sequence.

**boot flash**

Flash (temporary) memory that stores the boot code and boot.

**bport**

Back-end port of the ASIC.

**broadcast**

The transmission of data from a single source to all devices in the fabric, regardless of zoning. *See also* [multicast](#), [unicast](#).

**buffer-to-buffer flow control**

Management of the frame transmission rate in either a point-to-point topology or in an arbitrated loop. *See also* [BB\\_Credit](#).

**bypass circuitry**

Circuits that automatically remove a device from the data path when valid signals are dropped.

**CAM**

Content-addressable memory.

**cascade**

Two or more interconnected Fibre Channel switches. HP StorageWorks 1 GB and later switches can be cascaded up to 239 switches, with a recommended maximum of seven interswitch links (no path longer than eight switches). *See also* [fabric](#), [ISL](#).

**CDR**

Clock and data recovery circuitry.

**CFG**

Configuration.

**CFN**

Change fabric name. Refers to an ELS field that appears in `portLogDump` command output.

**chassis**

The metal frame in which the switch and switch components are mounted.

**CIM**

Common Information Model. A management structure enabling disparate resources to be managed by a common application.

**circuit**

An established communication path between two ports. Consists of two virtual circuits capable of transmitting in opposite directions.

**Class 1 service**

The class of frame-switching service for a dedicated connection between two communicating ports (also called *connection-oriented service*). Includes acknowledgement of frame delivery or nondelivery.

**Class 2 service**

A connectionless class of frame-switching service that includes acknowledgement of frame delivery or nondelivery.

**Class 3 service**

A connectionless class of frame-switching service that does not include acknowledgement of frame delivery or nondelivery. Can be used to provide a multicast connection between the frame originator and recipients, with acknowledgement of frame delivery or nondelivery.

**Class 4 service**

A connection-oriented service that allows fractional parts of the bandwidth to be used in a virtual circuit.

**Class 6 service**

A connection-oriented multicast service geared toward video broadcasts between a central server and clients.

**Class F service**

The class of frame-switching service for a direct connection between two switches, allowing communication of control traffic between the E\_Ports. Includes acknowledgement of data delivery or nondelivery.

**class of service**

A specified set of delivery characteristics and attributes for frame delivery.

**CLI**

Command line interface. An interface that depends entirely on the use of commands, such as through Telnet or SNMP, and does not involve a GUI.

**client**

An entity that, using its common transport (CT), makes requests of a server.

**CLS**

Close primitive signal. Used only in an arbitrated loop. Sent by an L\_Port that is currently communicating in the loop, to close communication with another L\_Port.

**CM**

Central memory.

**CMA**

Central memory architecture. An architecture centralizing memory usage in switches.



**CMBISR**

Central memory built-in self-repair.

**CMT**

Central memory test.

**community (SNMP)**

A relationship between a group of SNMP managers and an SNMP agent, in which authentication, access control, and proxy characteristics are defined. *See also* [SNMP](#).

**compact flash**

Flash (temporary) memory that is used in a manner similar to hard disk storage. It is connected to a bridging component that connects to the PCI bus of the processor. Not visible within the processor's memory space.

**congestion**

The realization of the potential of oversubscription. A congested link is one on which multiple devices are contending for bandwidth.

**connection initiator**

A port that has originated a Class 1 dedicated connection and received a response from the recipient.

**connection recipient**

A port that has received a Class 1 dedicated connection request and transmitted a response to the originator.

**controller**

A computer module that interprets signals between a host and a peripheral device. The controller typically is part of the peripheral device.

**core PID**

Core switch port identifier. The core PID must be set for OS v3.1 and earlier switches included in a fabric of v4.1 switches. This parameter is located in the `configure` command of firmware versions v3.1 and earlier. All v4.1 switches and above use the core PID format by default; this parameter is not present in the `configure` command for these switches.

**COS**

Class of service.

**CP**

Control processor.

**CPLD**

Complex PLD. Also called *Enhanced PLD (EPLD)*, *Super PAL*, and *Mega PAL*.

**CRC**

Cyclic redundancy check. A transmission error check that is included in every data frame.

**credit**

As it applies to Fibre Channel technology, the number of receive buffers available to transmit frames between ports. *See also* [BB\\_Credit](#), [EE\\_Credit](#).

**cut-through**

A switching technique that allows the route for a frame to be selected as soon as the destination address is received. *See also* [route](#).

**D\_ID**

Destination identifier. A 3-byte field in the frame header, used to indicate the address identifier of the N\_Port to which the frame is headed.

**datagram**

A Class 3 Fibre Channel service that allows data to be sent quickly to devices attached to the fabric, without receipt confirmation.

**DCE**

Data communications equipment. Usually refers to a modem.

**dedicated simplex**

A connection method that permits a single N\_Port to simultaneously initiate a session with one N\_Port as an initiator and have a separate Class 1 connection to another N\_Port as a recipient.

**DHCP**

Dynamic Host Configuration Protocol.

**DHCPD**

Dynamic Host Configuration Protocol daemon.

**disparity**

The proportion of 1s and 0s in an encoded character. *Neutral disparity* refers to an equal number of each, *positive disparity* means a majority of 1s, and *negative disparity* means a majority of 0s.

**DLS**

Dynamic load-sharing. Dynamic distribution of traffic over available paths. Allows for recomputing of routes when an Fx\_Port or E\_Port changes status.

**domain controller**

A domain controller (or embedded port) communicates with and gets updates from other switches' embedded ports. The well-known address is *fffcdd*, where *dd* = domain number.

**domain ID**

A unique identifier for all switches in a fabric, used in routing frames. Usually automatically assigned by the principal switch but can be assigned manually. The domain ID for an HP StorageWorks switch can be any integer between 1 and 239.

**E\_D\_TOV**

Error-detect timeout value. The minimum amount of time a target waits for a sequence to complete before initiating recovery. Can also be defined as the maximum time allowed for a round-trip transmission before an error is declared. *See also* [R\\_A\\_TOV](#), [RR\\_TOV](#).

**E\_Port**

Expansion port. A type of switch port that can be connected to an E\_Port on another switch to create an ISL. *See also* [ISL](#).

**ECCN**

Export classification control number. A government classification of encryption. For example, SSH is in the high-encryption category (number 5x02) and therefore has certain restrictions regarding its transfer.

**EE\_Credit**

End-to-end credit. The number of receive buffers allocated by a recipient port to an originating port. Used by Class 1 and 2 services to manage frame exchange across the fabric, between source and destination. *See also* [BB\\_Credit](#), [end-to-end flow control](#).

**ELP**

Exchange link parameters.

**ELS**

Extended link service. ELSs are sent to the destination N\_Port to perform the requested function or service. ELS is a Fibre Channel standard that is sometimes referred to as *Fibre Channel Physical (FC\_PH) ELS*.

**embedded port**

An embedded port (or domain controller) communicates and get updates from other switches' embedded ports. The well-known address is *fffcd*, where *dd* = domain number.

**end-to-end flow control**

Governs flow of Class 1 and 2 frames between N\_Ports. *See also* [EE\\_Credit](#).

**entry fabric**

The basic software license that allows one E\_Port per switch.

**EOF**

End of frame. A group of ordered sets used to mark the end of a frame.

**EVMd**

Event management database. Delivers FDMI-related events.

**exchange**

The highest-level Fibre Channel mechanism used for communication between N\_Ports. Composed of one or more related sequences, it can work in either one or both directions.

**F\_BSY**

Fabric port busy frame. A frame issued by the fabric to indicate that a frame cannot be delivered because the fabric or destination N\_Port is busy.

**F\_Port**

Fabric port. A port that is able to transmit under fabric protocol and interface over links. Can be used to connect an N\_Port to a switch. *See also* [FL\\_Port](#), [Fx\\_Port](#).

**F\_RJT**

Fabric port reject frame. A frame issued by the fabric to indicate that delivery of a frame is being denied, perhaps because a class is not supported, there is an invalid header, or no N\_Port is available.

**fabric**

A Fibre Channel network containing two or more switches in addition to hosts and devices. Also called a *switched fabric*. *See also* [cascade](#), [SAN](#), [topology](#).

**Fabric Manager**

An optionally licensed software. Fabric Manager is a GUI that allows for fabric-wide administration and management. Switches can be treated as groups, and actions such as firmware downloads can be performed simultaneously.

**Fabric Mode**

One of two possible modes for an L\_Port, in which the L\_Port is connected to another port that is not loop capable, using fabric protocol.

**fabric name**

The unique identifier assigned to a fabric and communicated during login and port discovery.

**fabric port count**

The number of ports available for connection by nodes in a fabric.

**fabric services**

Codes that describe the communication to and from any well-known address.

**fabric topology**

The arrangement of switches that form a fabric.

**Fabric Watch**

An optionally licensed software. Fabric Watch can be accessed through either the command line or Advanced Web Tools, and it provides the ability to set thresholds for monitoring fabric conditions.

**failover**

Describes the Core Switch 2/64 and SAN Director 2/128 process of one CP passing active status to another CP. A failover is nondisruptive.

**FAN**

Fabric address notification. Retains the AL\_PA and fabric address when a loop reinitializes, if the switch supports FAN.

**FC-0**

Lowest layer of Fibre Channel transport. Represents physical media.

**FC-1**

Layer of Fibre Channel transport that contains the 8b/10b encoding scheme.

**FC-2**

Layer of Fibre Channel transport that handles framing and protocol, frame format, sequence exchange management, and ordered set usage.

**FC-3**

Layer of Fibre Channel transport that contains common services used by multiple N\_Ports in a node.

**FC-4**

Layer of Fibre Channel transport that handles standards and profiles for mapping upper-level protocols such as SCSI and IP onto the Fibre Channel Protocol.

**FC-AL-3**

The Fibre Channel arbitrated-loop standard defined by ANSI. Defined on top of the FC-PH standards.

**FC-AV**

Fibre Channel audio visual.

**FC-CT**

Fibre Channel common transport.

**FC-FG**

Fibre Channel generic requirements.

**FC-FLA**

The Fibre Channel fabric loop-attach standard defined by ANSI.

**FC-FS**

Fibre Channel framing and signaling.

**FC-GS**

Fibre Channel generic services.

**FC-GS-2**

Fibre Channel generic services, second generation.

**FC-GS-3**

Fibre Channel Generic Services, third generation.

**FC\_IP**

Fibre Channel-over-IP.

**FC-PH**

The Fibre Channel physical and signaling standard for FC-0, FC-1, and FC-2 layers of the Fibre Channel Protocol. Indicates signaling used for cable plants, media types, and transmission speeds.

**FC-PH-2**

Fibre Channel Physical Interface, second generation.

**FC-PH-3**

Fibre Channel Physical Interface, third generation.

**FC-PI**

Fibre Channel Physical Interface standard, defined by ANSI.

**FC-PLDA**

The Fibre Channel Private Loop Direct Attach standard defined by ANSI. Applies to the operation of peripheral devices on a private loop.

**FC\_SB**

Fibre Channel single bytes.

**FC\_VI**

Fibre Channel virtual interface.

**FCA**

Flow-control acknowledgement (DLSW).

**FCIA**

Fibre Channel Industry Association. An international organization of Fibre Channel industry professionals. Provides oversight of ANSI and industry-developed standards, among other tasks.

**FCLC**

Fibre Channel Loop Community.

**FCP**

Fibre Channel Protocol. Mapping of protocols onto the Fibre Channel standard protocols. For example, SCSI FCP maps SCSI-3 onto Fibre Channel.

**FCS**

Fibre Channel Standard.

**FCS switch**

Relates to the Secure Fabric OS feature. One or more designated switches that store and manage security parameters and configuration data for all switches in the fabric. They also act as a set of backup switches to the primary FCS switch. *See also* [backup FCS switch](#), [primary FCS switch](#).

**FC-SW-2**

The second-generation Fibre Channel Switch Fabric standard defined by ANSI. Specifies tools and algorithms for the interconnection and initialization of Fibre Channel switches to create a multiswitch Fibre Channel fabric.

**FDDI**

Fibre Distributed Data Interface. An ANSI architecture for a metropolitan area network (MAN); a network based on the use of fiber-optic cable to transmit data at 100 Mb/sec.

**FDMI**

Fabric-Device Management Interface. FDMI is a database service provided by the fabric for Nx\_Ports. The primary use is by HBA devices that register information about themselves and their ports.

**FFFFF5**

Well-known Fibre Channel address for a Class 6 multicast server.

**FFFFF6**

Well-known Fibre Channel address for a clock synchronization server.

**FFFFF7**

Well-known Fibre Channel address for a security key distribution server.

**FFFFF8**

Well-known Fibre Channel address for an alias server.

**FFFFF9**

Well-known Fibre Channel address for a QoS facilitator.

**FFFFFA**

Well-known Fibre Channel address for a management server.

**FFFFFB**

Well-known Fibre Channel address for a time server.

**FFFFFC**

Well-known Fibre Channel address for a directory server.

**FFFFFD**

Well-known Fibre Channel address for a fabric controller.

**FFFFFE**

Well-known Fibre Channel address for a fabric F\_Port.

**FFFFF5**

Well-known Fibre Channel address for a broadcast alias ID.

**Fibre Channel**

Fibre Channel is a protocol used to transmit data between servers, switches, and storage devices. It is a high-speed, serial, bidirectional, topology-independent, multiprotocol, and highly scalable interconnection between computers, peripherals, and networks.

**Fibre Channel transport**

A protocol service that supports communication between Fibre Channel service providers. *See also* [FSP](#).

**FIFO**

First in, first out. Refers to a data buffer that follows the first in, first out rule.

**fill word**

An IDLE or ARB ordered set that is transmitted during breaks between data frames to keep the Fibre Channel link active.

**firmware**

The basic operating system provided with the hardware.

**FL\_Port**

Fabric loop port. A port that is able to transmit under fabric protocol and also has arbitrated loop capabilities. Can be used to connect an NL\_Port to a switch. *See also* [F\\_Port](#), [Fx\\_Port](#).

**flash**

Programmable nonvolatile RAM (NVRAM) memory that maintains its contents without power.

**FLOGI**

Fabric login. The process by which an N\_Port determines whether a fabric is present and, if so, exchanges service parameters with it. *See also* [PLOGI](#).

**FOTP**

Fiber Optic Test Procedure. Standards developed and published by the Electronic Industries Association (EIA) under the EIA-RS-455 series of standards.

**FPD**

Field-programmable device. Interchangeable with “PLD.”

**FPGA**

Field-programmable gate array. An FPD that allows high logic capacity.

**fractional bandwidth**

The partial use of a link to send data back and forth, with a maximum of 254 Class 4 connections per N\_Port.

**frame**

The Fibre Channel structure used to transmit data between ports. Consists of a start-of-frame delimiter, header, optional headers, data payload, cyclic redundancy check (CRC), and end-of-frame delimiter. There are two types of frames: link control frames (transmission acknowledgements and so forth) and data frames.

**frame relay**

A protocol that uses logical channels, as used in X.25. Provides very little error-checking ability. Discards frames that arrive with errors. Allows a certain level of bandwidth between two locations (called a *committed information rate* or CIR) to be guaranteed by service provider. If CIR is exceeded for short periods (called *bursts*), the network accommodates the extra data, if spare capacity is available. Frame relay is therefore known as *bandwidth on demand*.

**FRU**

Field-replaceable unit. A component that can be replaced on site.

**FS**

Fibre Channel service. A service that is defined by Fibre Channel standards and exists at a well-known address. For example, the Simple Name Server is a Fibre Channel service. *See also* [FSP](#).

**FSP**

Fibre Channel Service Protocol. The common protocol for all fabric services, transparent to the fabric type or topology. *See also* [FS](#).

**FSPF**

Fabric shortest path first. The routing protocol for Fibre Channel switches.

**FSS**

Fabric OS state synchronization. The FSS service is related to high availability (HA). The primary function of FSS is to deliver state update messages from active components to their peer standby components. FSS determines if fabric elements are synchronized (and are thus FSS compliant).

**FTP**

File Transfer Protocol.

**FTS**

Fiber Transport Services.

**full fabric**

The software license that allows multiple E\_Ports on a switch, making it possible to create multiple ISL links.

**full fabric citizenship**

A loop device that has an entry in the Simple Name Server.

**full duplex**

A mode of communication that allows the same port to simultaneously transmit and receive frames. *See also* [half duplex](#).

**Fx\_Port**

A fabric port that can operate as either an F\_Port or FL\_Port. *See also* [F\\_Port](#), [FL\\_Port](#).

**G\_Port**

Generic port. A port that can operate as either an E\_Port or an F\_Port. A port is defined as a G\_Port when it is not yet connected or has not yet assumed a specific function in the fabric.

**gateway**

Hardware that connects incompatible networks by providing translation for both hardware and software. For example, an ATM gateway can be used to connect a Fibre Channel link to an ATM connection.

**GBIC**

Gigabit interface converter. A removable serial transceiver module that allows gigabaud physical-level transport for Fibre Channel and gigabit Ethernet.

**Gb/sec**

Gigabits per second (1,062,500,000 bits/second).

**GB/sec**

Gigabytes per second (1,062,500,000 bytes/second).

**GLM**

Gigabit Link Module. A semitransparent transceiver that incorporates serializing and deserializing functions.

**GMT**

Greenwich Mean Time. An international time zone. Also called *UTC*.

**GUI**

A graphic user interface, such as Advanced Web Tools and Fabric Manager.

**HA**

High availability. The High Availability features in HP StorageWorks switches are designed to provide maximum reliability and nondisruptive replacement of key hardware and software modules.



**half duplex**

A mode of communication that allows a port to either transmit or receive frames at any time except simultaneously (with the exception of link control frames, which can be transmitted at any time). *See also* [full duplex](#).

**hard address**

The AL\_PA that an NL\_Port attempts to acquire during loop initialization.

**HBA**

Host bus adapter. The interface card between a server or workstation bus and the Fibre Channel network.

**HCPLD**

High-capacity PLD. Refers to both CPLDs and FPGAs.

**header**

A Fibre Channel frame has a header and a payload. The header contains control and addressing information associated with the frame.

**hop count**

The number of ISLs a frame must traverse to get from its source to its destination.

**host**

A computer system that provides end users with services like computation and storage access.

**hot swappable**

A hot-swappable component can be replaced under power.

**HSSDC**

High-speed serial data connection. A form factor that allows quick connections for copper interface.

**HSSDC-2**

A second-generation HSSDC connector.

**hub**

A Fibre Channel wiring concentrator that collapses a loop topology into a physical star topology. Nodes are automatically added to the loop when active and removed when inactive.

**idle**

Continuous transmission of an ordered set over a Fibre Channel link when no data is being transmitted, to keep the link active and maintain bit, byte, and word synchronization.

**iFCP**

Internet Fibre Channel Protocol. Supports Fibre Channel Layer 4 FCP-over-TCP/IP. It is a gateway-to-gateway protocol in which TCP/IP switching and routing components enhance or replace Fibre Channel fabric.

**in-band**

Transmission of management protocol over the Fibre Channel.

**initiator**

A server or workstation on a Fibre Channel network that initiates communication with storage devices. *See also* [target](#).

**integrated fabric**

The fabric created by an HP StorageWorks SAN Switch Integrated/64, consisting of six switches cabled together and configured to handle traffic seamlessly as a group.

**intermix**

Allows any unused bandwidth in a Class 1 connection.

**interswitch link**

*See also* [ISL](#).

**IOCTL**

I/O control.

**IOD**

In-order delivery. A parameter that, when set, guarantees that frames are either delivered in order or dropped.

**IP**

Internet Protocol. The addressing part of TCP.

**IPI**

Intelligent Peripheral Interface.

**ISC**

Internet Software Consortium.

**iSCSI**

Internet Small Computer Systems Interface. A protocol that defines the processes for transferring block storage applications over TCP/IP networks by encapsulating SCSI commands into TCP and transporting them over the network via IP.

**ISL**

Interswitch link. A Fibre Channel link from the E\_Port of one switch to the E\_Port of another. *See also* [cascade](#), [E\\_Port](#).

**ISL oversubscription ratio**

The ratio of the number of free ports (non-ISL) to the number of ISLs on a switch.

**isolated E\_Port**

An E\_Port that is online but not operational due to overlapping domain IDs or nonidentical parameters (such as E\_D\_TOVs). *See also* [E\\_Port](#).

**ISP**

Internet service provider.

**IU**

Information unit. A set of information as defined by either an upper-level process protocol definition or upper-level protocol mapping.

**L\_Port**

Loop port. A node port (NL\_Port) or fabric port (FL\_Port) that has arbitrated loop capabilities. An L\_Port can be in either Fabric Mode or Loop Mode.

**LAN**

Local area network. A network in which transmissions typically take place over fewer than 5 kilometers (3.4 miles).

**latency**

The time required to transmit a frame. Together, latency and bandwidth define the speed and capacity of a link or system.

**link control facility**

A termination, handling physical and logical control of the Fibre Channel link for each mode.

**Link Services**

A protocol for link-related actions.

**LM\_TOV**

Loop master timeout value. The minimum time that the loop master waits for a loop initialization sequence to return.

**MB/sec**

Megabytes per second.

**Mb/sec**

Megabits per second.

**metric**

A relative value assigned to a route to aid in calculating the shortest path (1000 at 1 Gb/sec, 500 at 2 Gb/sec).

**MIA**

Media interface adapter. A device that converts optical connections to copper ones, and vice-versa.

**MIB**

Management Information Base. An SNMP structure to help with device management, providing configuration and device information.

**MRK**

Mark primitive signal. Used only in an arbitrated loop, MRK is transmitted by an L\_Port for synchronization and is vendor specific.

**MS**

Management Server. The Management Server allows a storage area network (SAN) management application to retrieve information and administer the fabric and interconnected elements, such as switches, servers, and storage devices. The MS is located at the Fibre Channel well-known address FFFFFAh.

**MSD**

Management Server daemon. Monitors the MS. Includes the Fabric Configuration Service and the Unzoned Name Server.

**MTBF**

Mean time between failures. An expression of time, indicating the longevity of a device.

**multicast**

The transmission of data from a single source to multiple specified N\_Ports (as opposed to all the ports on the network). *See also* [broadcast](#), [unicast](#).

**N\_Port**

Node port. A port on a node that can connect to a Fibre Channel port or to another N\_Port in a point-to-point connection. *See also* [NL\\_Port](#), [Nx\\_Port](#).

**Name Server**

Simple Name Server (SNS). A switch service that stores names, addresses, and attributes for up to 15 minutes and provides them as required to other devices in the fabric. SNS is defined by Fibre Channel standards and exists at a well-known address. Also called a *directory service*.

**NAS**

Network-attached storage. A disk array connected to a controller that gives access via a LAN.

**NDMP**

Network Data Management Protocol. Used for tape backup without using server resources.

**NL\_Port**

Node loop port. A node port that has arbitrated loop capabilities. Used to connect an equipment port to the fabric in a loop configuration through an FL\_Port. *See also* [N\\_Port](#), [Nx\\_Port](#).

**node**

A Fibre Channel device that contains an N\_Port or NL\_Port.

**node count**

The number of nodes attached to a fabric.

**node name**

The unique identifier for a node, communicated during login and port discovery.

**Nonparticipating Mode**

A mode in which an L\_Port in a loop is inactive and cannot arbitrate or send frames but can retransmit received transmissions. This mode is entered if there are more than 127 devices in a loop and an AL\_PA cannot be acquired. *See also* [L\\_Port](#), [Participating Mode](#).

**NOS**

Not operational. The NOS primitive sequence is transmitted to indicate that the FC\_Port transmitting the NOS has detected a link failure or is offline, waiting for the offline sequence (OLS) to be received.

**NS**

Name Server. The service provided by a fabric switch that stores names, addresses, and attributes related to Fibre Channel objects. Can cache information for up to 15 minutes. Also called a *Simple Name Server* or a *directory service*. *See also* [Simple Name Server \(SNS\)](#).

**NSCAM**

Name Server Cache Manager. Updates the Name Server (NS) databases across switches as a background task.

**Nx\_Port**

A node port that can operate as either an N\_Port or NL\_Port.

**OFC**

Open fiber control. A method used to enable and disable laser signaling for higher-intensity laser transceivers.

**OLS**

Primitive sequence offline.

**OLTP**

Online transaction processing.

**ON**

Offline notification. Refers to an ELS field that appears in `portLogDump` command output.

**OPN**

Open primitive signal. Applies only to an arbitrated loop; sent by an L\_Port that has won the arbitration process to open communication with one or more ports on the loop.

**ordered set**

A transmission word that uses 8b/10b mapping and begins with the K28.5 character. Ordered sets occur outside of frames and include the following items:

**Frame delimiters.** Mark frame boundaries and describe frame contents.

**Primitive signals.** Indicate events.

**Primitive sequences.** Indicate or initiate port states.

Ordered sets are used to differentiate Fibre Channel control information from data frames and to manage frame transport.

**originator**

The Nx\_Port that originated an exchange.

**out of band**

Transmission of management protocol outside of the Fibre Channel network, usually over Ethernet.

**oversubscription**

A situation in which more nodes could potentially contend for a resource than the resource could simultaneously support (typically an ISL). Oversubscription could be a desirable attribute in fabric topology, as long as it does not produce unacceptable levels of congestion.

**OX\_ID**

Originator ID. Refers to the exchange ID assigned by the originator port.

**packet**

A set of information transmitted across a network. *See also* [frame](#).

**PAL**

Programmable Array Logic. A relatively small FPD.

**parallel**

The simultaneous transmission of data bits over multiple lines.

**Participating Mode**

A mode in which an L\_Port in a loop has a valid AL\_PA and can arbitrate, send frames, and retransmit received transmissions. *See also* [L\\_Port](#), [Nonparticipating Mode](#).

**path selection**

The selection of a transmission path through the fabric. HP StorageWorks switches use the FSPF protocol. *See also* [FSPF](#).

**payload**

A Fibre Channel frame has a header and a payload. The payload contains the information being transported by the frame; it is determined by the higher-level service or FC\_4 upper-level protocol. There are many different payload formats.

**Performance Monitoring**

An HP StorageWorks switch feature that monitors port traffic and includes frame counters, SCSI read monitors, SCSI write monitors, and other types of monitors.

**persistent error log**

Error messages of a high enough level (by default, Panic or Critical) are saved to flash memory on the switch instead of to RAM. These messages are saved over reboots and power cycles, constituting the persistent error log. Note that each CP on a Core Switch 2/64 and SAN Director 2/128 has its own unique persistent error log.

**phantom address**

An AL\_PA value that is assigned to a device that is not physically in the loop. Also called a *phantom AL\_PA*.

**phantom device**

A device that is not physically in an arbitrated loop but is logically included through the use of a phantom address.

**PID**

Port identifier. *See also* [core PID](#).

**PLA**

Programmable logic array. A small FPD.

**PLD**

Programmable logic device. Interchangeable with “FPD.”

**PLDA**

Private loop direct-attached. A technical report specifying a logical loop.

**PLOGI**

Port login. The port-to-port login process by which initiators establish sessions with targets. *See also* [FLOGI](#).

**point to point**

A Fibre Channel topology that employs direct links between each pair of communicating entities. *See also* [topology](#).

**port**

In an HP StorageWorks switch environment, an SFP or GBIC receptacle on a switch to which an optic cable for another device is attached.

**port address**

In Fibre Channel technology, the port address is defined in hexadecimal. In the Fabric OS, a port address can be defined by a domain and port number combination or by area number. In an ESCON Director, an address used to specify port connectivity parameters and to assign link addresses for attached channels and control units.

**port cage**

The metal casing extending out of the optical port on the switch, into which the SFP can be inserted.

**port card**

A hardware component that provides a platform for field-replaceable, hot-swappable ports.

**port log**

A record of all activity on a switch, kept in volatile memory.

**port log dump**

A view of what happens on a switch, from the switch's point of view. The `portLogDump` command is used to read the port log.

**port name**

A user-defined alphanumeric name for a port.

**port swapping**

Port swapping is the ability to redirect a failed port to another port. This feature is available in Fabric OS v4.1.0 and higher.

**port\_name**

The unique identifier assigned to a Fibre Channel port. Communicated during login and port discovery.

**POST**

Power-on self-test. A series of tests run by a switch after it is turned on.

**PPP**

Point-to-Point Protocol.

**primary FCS switch**

Relates to the Secure Fabric OS feature. The primary fabric configuration server switch actively manages security and configurations for all switches in the fabric. *See also* [backup FCS switch](#), [FCS switch](#).

**primitive sequence**

An ordered set that is transmitted repeatedly and continuously. Primitive sequences are transmitted to indicate specific conditions within or conditions encountered by the receiver logic of an FC\_Port. *See* [OLS](#) and [NOS](#).

**primitive signals**

An ordered set that indicates actions or events and requires just one occurrence to trigger a response. Idle and R\_RDY are used in all three topologies: ARB, OPN, and CLS. MRK is used in arbitrated loop.

**principal switch**

The first switch to boot up in a fabric. Ensures unique domain IDs among roles.

**private device**

A device that supports arbitrated-loop protocol and can interpret 8-bit addresses but cannot log in to the fabric.

**private loop**

An arbitrated loop that does not include a participating FL\_Port.

**private loop device**

A device that supports a loop and can understand 8-bit addresses but does not log in to the fabric.

**private NL\_Port**

An NL\_Port that communicates only with other private NL\_Ports in the same loop and does not log in to the fabric.

**protocol**

A defined method and set of standards for communication. Determines the type of error-checking, the data-compression method, how sending devices indicate an end of message, and how receiving devices indicate receipt of a message.

**pstate**

Port State Machine.

**public device**

A device that supports arbitrated-loop protocol, can interpret 8-bit addresses, and can log in to the fabric.

**public loop**

An arbitrated loop that includes a participating FL\_Port and can contain both public and private NL\_Ports.

**public NL\_Port**

An NL\_Port that logs in to the fabric, can function within either a public or a private loop, and can communicate with either private or public NL\_Ports.

**QoS**

Quality of service.

**quad**

A group of four adjacent ports that share a common pool of frame buffers.

**queue****R\_A\_TOV**

Resource allocation timeout value. The maximum time a frame can be delayed in the fabric and still be delivered. *See also* [E\\_D\\_TOV](#), [RR\\_TOV](#).

**R\_CTL**

Route control. The first 8 bits of the header, which defines the type of frame and its contents.

**R\_RDY**

Receiver ready. A primitive signal indicating that the port is ready to receive a frame.

**R\_T\_TOV**

Receiver transmitter timeout value, used by receiver logic to detect loss of synchronization between transmitters and receivers.

**radius**

The greatest distance between any edge switch and the center of a fabric. A low-radius network is better than a high-radius network.

**RCS**

Reliable Commit Service. Refers to ILS command code.

**RCS\_SFC**

RCS Stage Fabric Config. Refers to ILS command code.

**request rate**

The rate at which requests arrive at a servicing entity.

**resilience**

A fabric's ability to adapt to or tolerate a failure of a component within the fabric.

**resilient core and edge topology**

Two or more switches acting as a core to interconnect multiple edge switches. Nodes attach to the edge switches.

**responder**

The N\_Port with which an exchange originator wants to communicate.

**retimer**

A circuit that uses an independent clock to generate outbound signals.

**return loss**

The ratio (expressed in dB) of incident power to reflected power, when a component or assembly is introduced into a link or system. Can refer to optical power or to electrical power in a specified frequency range.

**RLS**

Read Link Status.



**route**

As it applies to a fabric, the communication path between two switches. Might also apply to the specific path taken by an individual frame, from source to destination. *See also* [FSPF](#).

**routing**

The assignment of frames to specific switch ports, according to frame destination.

**RR\_TOV**

Resource recovery timeout value. The minimum time a target device in a loop waits after an LIP before logging out an SCSI initiator. *See also* [E\\_D\\_TOV](#), [R\\_A\\_TOV](#).

**RSCN**

Registered state change notification. A switch function that allows notification of fabric changes to be sent from the switch to specified nodes. The fabric controller issues RSCN requests to N\_Ports and NL\_Ports, but only if they have registered to be notified of state changes in other N\_Ports and NL\_Ports. This registration is performed via the State Change Registration (SCR) Extended Link Service. An N\_Port or NL\_Port can issue an RSCN to the fabric controller without having completed SCR with the fabric controller.

**RTWR**

Reliable transport with response. Might appear as a task in `portLogDump` command output.

**running disparity**

A binary parameter indicating the cumulative disparity (positive or negative) of all previously issued transmission characters.

**RW**

Read/write. Refers to access rights.

**RX**

Receiving frames.

**RX\_ID**

Responder exchange identifier. A 2-byte field in the frame header that can be used by the responder of the exchange to identify frames as being part of a particular exchange.

**S\_ID**

Source ID. Refers to the native port address (24 bit address).

**SAN**

Storage area network. A network of systems and storage devices that communicate using Fibre Channel protocols. *See also* [fabric](#).

**SAN architecture**

The overall design of a storage network solution, which includes one or more related fabrics, each of which has a topology.

**SAN port count**

The number of ports available for connection by nodes in the entire SAN.

**scalability**

One of the properties of a SAN: the size to which a SAN topology can grow port and switch counts with ease.

**SCN**

State change notification. Used for internal state change notifications, not external changes. This is the switch logging that the port is online or is an Fx\_port, not what is sent from the switch to the Nx\_Ports.

**SCR**

State change registration. Extended Link Service (ELS) requests the fabric controller to add the N\_Port or NL\_Port to the list of N\_Ports and NL\_Ports registered to receive the Registered State Change Notification (RSCN) Extended Link Service.

**SCSI**

Small Computer Systems Interface. A parallel bus architecture and a protocol for transmitting large data blocks to a distance of 15 to 25 meters.

**SCSI-2**

An updated version of the SCSI bus architecture.

**SCSI-3**

An SCSI standard that defines transmission of SCSI protocol data over different kinds of links.

**SDRAM**

The main memory for a switch.

**sectelnet**

A protocol similar to Telnet but with encrypted passwords for increased security.

**Secure Fabric OS**

A separately sold feature that provides advanced, centralized security for a fabric.

**security policy**

Rules that determine how security is implemented in a fabric. Security policies can be customized through Secure Fabric OS or Fabric Manager.

**SEQ\_ID**

Sequence identifier. A 1-byte field in the frame header that identifies the frames as part of a particular exchange sequence between a pair of ports.

**sequence**

A group of related frames transmitted in the same direction between two N\_Ports.

**sequence initiator**

The N\_Port that begins a new sequence and transmits frames to another N\_Port.

**sequence recipient**

Serializing and deserializing circuitry. A circuit that converts a serial bit stream into parallel characters, and vice-versa.

**serial**

The transmission of data bits in sequential order over a single line.

**server**

A computer that processes end-user applications or requests.

**service rate**

The rate at which an entity can service requests. *See also* [request rate](#).

**SES**

SCSI Enclosure Services. A subset of the SCSI protocol used to monitor temperature, power, and fan status for enclosed devices.

**Simple Name Server (SNS)**

A switch service that stores names, addresses, and attributes for up to 15 minutes and provides them as required to other devices in the fabric. SNS is defined by Fibre Channel standards and exists at a well-known address. Also called a *directory service* or *name server*.

**Single CP Mode**

The `-s` option of the `firmwareDownload` command. Using `firmwareDownload -s` enables Single CP Mode. In the Core Switch 2/64 and SAN Director 2/128, Single CP Mode enables a user to upgrade a single CP and to select full install, autoreboot, and autocommit.

**Single Mode**

The fiber-optic cabling standard for devices up to 10 km apart.

**S-Link Service**

Facilities used between an N\_Port and the fabric, or between two N\_Ports, for login, sequence and exchange management, and maintaining connections.

**SMDS**

Switched Multimegabit Data Service. A good protocol for interconnecting LANs; however, SMDS has less error-checking capability than Frame Relay.

**SMI**

Structure of management information. A notation for setting or retrieving SNMP management variables.

**SNA/SDLC**

Systems Network Architecture/Synchronous Data Link Control. A structure for transferring data among a variety of computing platforms.

**SNMP**

Simple Network Management Protocol. An Internet management protocol that uses either IP for network-level functions and UDP for transport-level functions, or TCP/IP for both. Can be made available over other protocols, such as UDP/IP, because it does not rely on the underlying communication protocols. *See also* [community \(SNMP\)](#).

**SNS**

Simple Name Server.

**SOF**

Start of frame. A group of ordered sets that marks the beginning of a frame and indicates the class of service the frame will use.

**SONET**

Synchronous optical network. A standard for optical networks that provides building blocks and flexible payload mappings.

**SPOF**

Single point of failure. Any component in a SAN whose malfunction could bring down the entire SAN.

**SQ\_ID**

Sequence ID. Used to identify and track all of the frames within a sequence between a source (S\_ID) and destination (D\_ID) port pair.

**SRM**

Storage resource management. The management of disk volumes and file resources.

**SSH**

Secure shell. Used starting in Fabric OS v4.1 to support encrypted Telnet sessions to the switch. SSH encrypts all messages, including the client sending the password at login.

**striping**

A RAID technique for writing a file to multiple disks on a block-by-block basis, with or without parity.

**switch**

A fabric device providing bandwidth and high-speed routing of data via link-level addressing.

**switch name**

The arbitrary name assigned to a switch.

**switch port**

A port on a switch. Switch ports can be E\_Ports, F\_Ports, or FL\_Ports.

**target**

A storage device on a Fibre Channel network. *See also* [initiator](#).

**TC**

Track changes.

**TCP/IP**

Transmission Control Protocol/Internet Protocol.

**Telnet**

A virtual terminal emulation used with TCP/IP. *Telnet* is sometimes used as a synonym for the Fabric OS CLI.

**throughput**

The rate of data flow achieved within a cable, link, or system. Usually measured in bps (bits per second or b/sec). *See also* [bandwidth](#).

**tiering**

The process of grouping particular SAN devices by function and then attaching these devices to particular switches or groups of switches based on that function.

**Time Server**

A Fibre Channel service that allows for the management of all timers.

**topology**

As it applies to Fibre Channel technology, the configuration of the Fibre Channel network and the resulting communication paths allowed. There are three possible topologies:

**Point to point.** A direct link between two communication ports.

**Switched fabric.** Multiple N\_Ports linked to a switch by F\_Ports.

**Arbitrated loop.** Multiple NL\_Ports connected in a loop.

**trap (SNMP)**

The message sent by an SNMP agent to inform the SNMP management station of a critical error. *See also* [SNMP](#).

**trunking**

In Fibre Channel technology, a feature that enables distribution of traffic over the combined bandwidth of up to four ISLs between adjacent switches, while preserving in-order delivery.

**trunking group**

A set of up to four trunked ISLs.

**U\_Port**

Universal port. A switch port that can operate as a G\_Port, E\_Port, F\_Port, or FL\_Port. A port is defined as a U\_Port when it is not connected or has not yet assumed a specific function in the fabric.

**ULP\_TOV**

Upper-level timeout value. The minimum time that an SCSI ULP process waits for SCSI status before initiating ULP recovery.

**unicast**

The transmission of data from a single source to a single destination. *See also* [broadcast](#), [multicast](#).

**UTC**

Universal Time Conversion. Also called *Coordinated Universal Time*, which is an international standard of time. UTC is 8 hours behind Pacific Standard Time and 5 hours behind Eastern Standard Time. *See also* [GMT](#).

**WAN**

Wide area network.

**WWN**

World Wide Name. An identifier that is unique worldwide. Each entity in a fabric has a separate WWN.

**X.25**

A protocol that uses logical channels. X.25 allows high-quality communications between computers and can accommodate noisy data communications through error-detection and -correction (retransmission) algorithms.

**zone**

A set of devices and hosts attached to the same fabric and configured as being in the same zone. Devices and hosts within the same zone have access to others in the zone but are not visible to any outside the zone.

**zoning**

A feature in fabric switches or hubs that allows segmentation of a node by physical port, name, or address.



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